

# KIC 004141670

## Q1-17 DR25 TCE Parameters

TCE	Run Type	KOI?	Period (Days)	Epoch (BKJD)	Depth (ppm)	Duration (Hours)	MES	SNR	$R_{\star}$ ( $R_{\odot}$ )	$T_{\star}$ (K)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004141670-01	OBS	No	2.354437	132.171153	18.3	2.780	9.3	7.4	1.62	7181	0.80	4177.58
004141670-02	OBS	No	421.437706	305.689514	182.9	26.349	27.4	7.1	1.62	7181	2.21	4.14
004141670-03	OBS	No	2.354663	133.264643	20.2	3.699	10.6	9.3	1.62	7181	0.84	4177.05

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004141670-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004141670-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004141670-03	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD

**Notes:** OBS = Observed. INJ = Injected. INV = Inverted. SCR = Scrambled.

N = Not Transit-Like. S = Stellar Eclipse. C = Centroid Offset. E = Ephemeris Match.

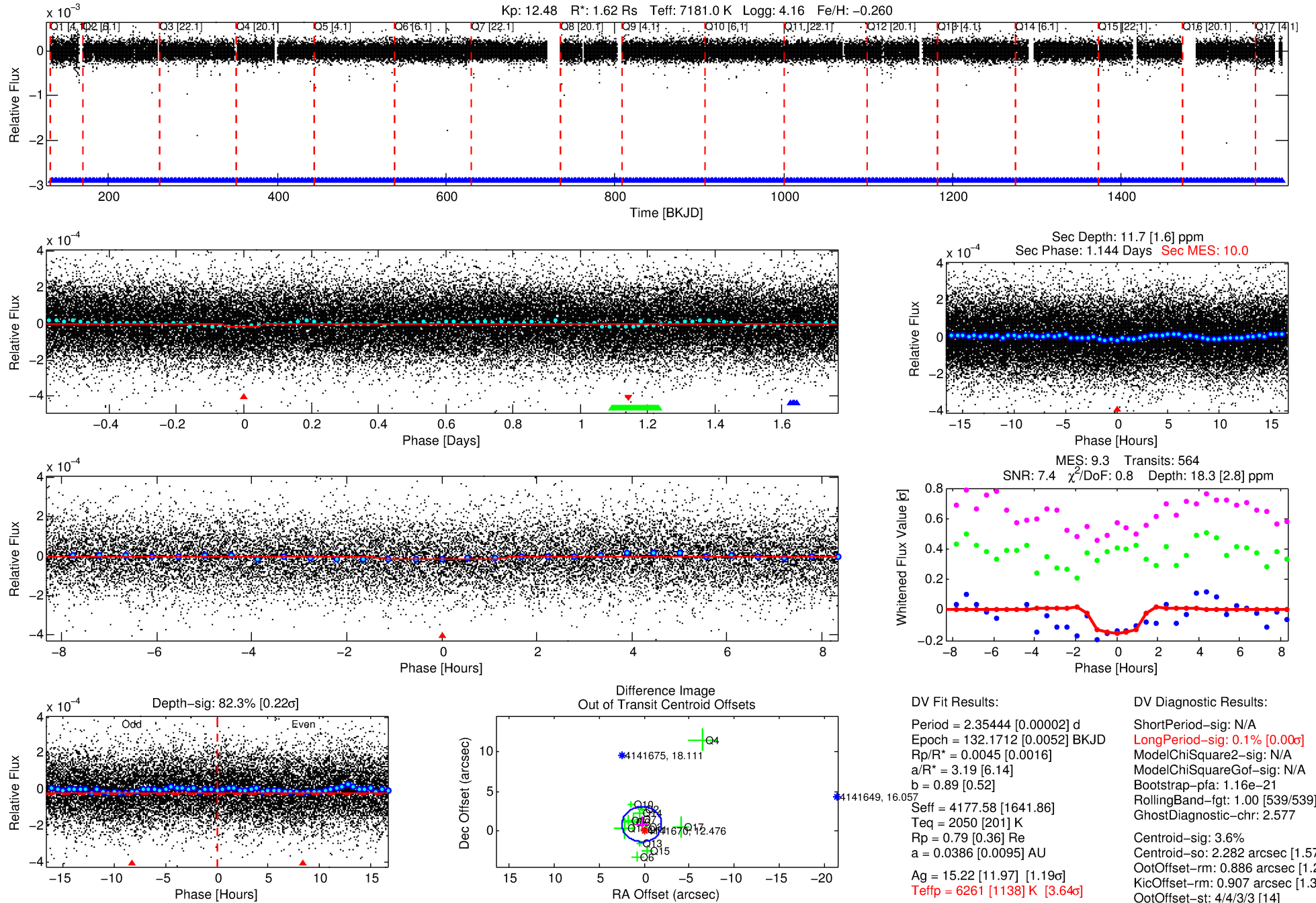
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 004141670-01

No Significant Match Found

# DV One-Page Summary

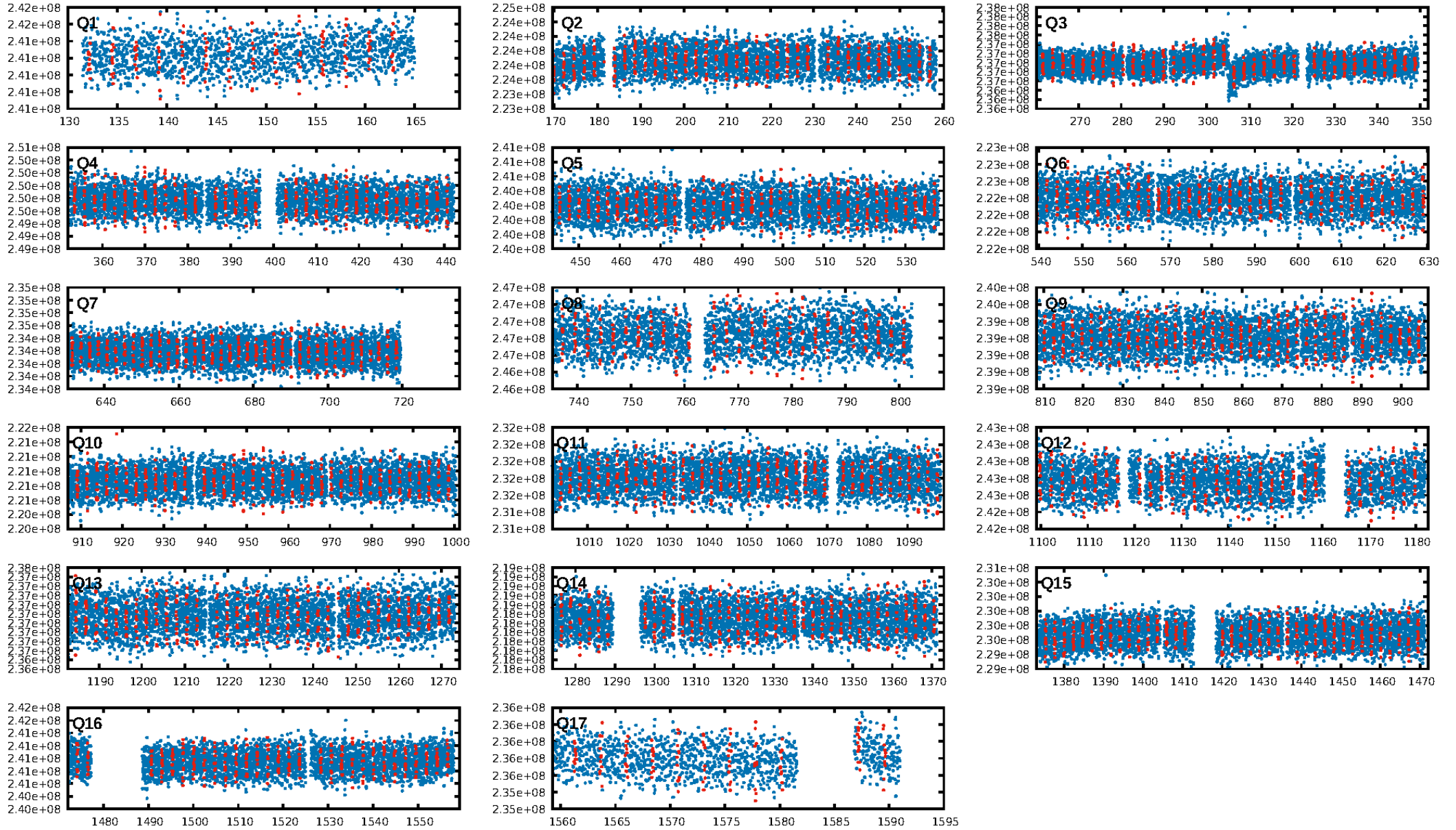
KIC: 4141670 Candidate: 1 of 3 Period: 2.354 d



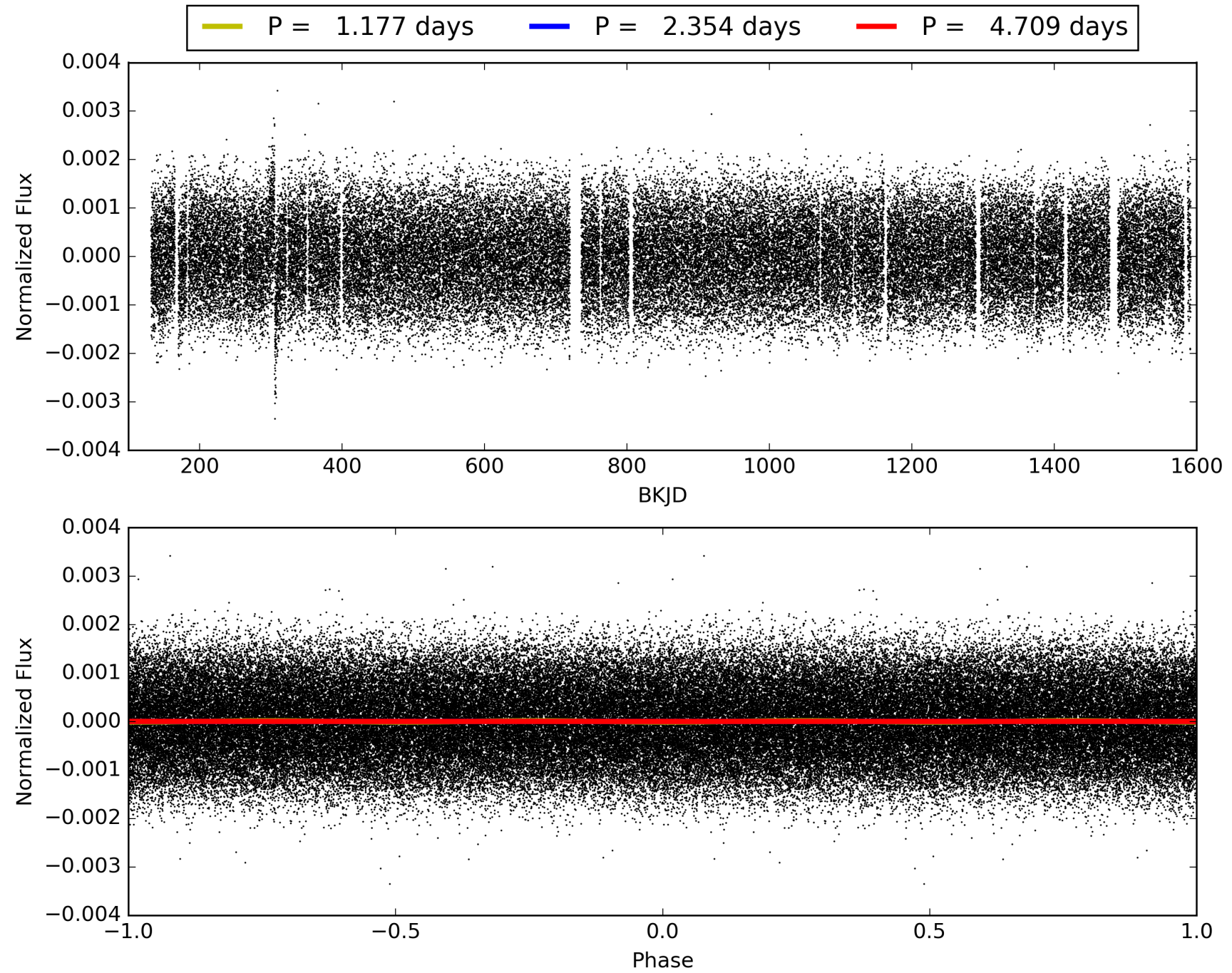
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 13:16:34 Z

This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 004141670-01, PDC Light Curves



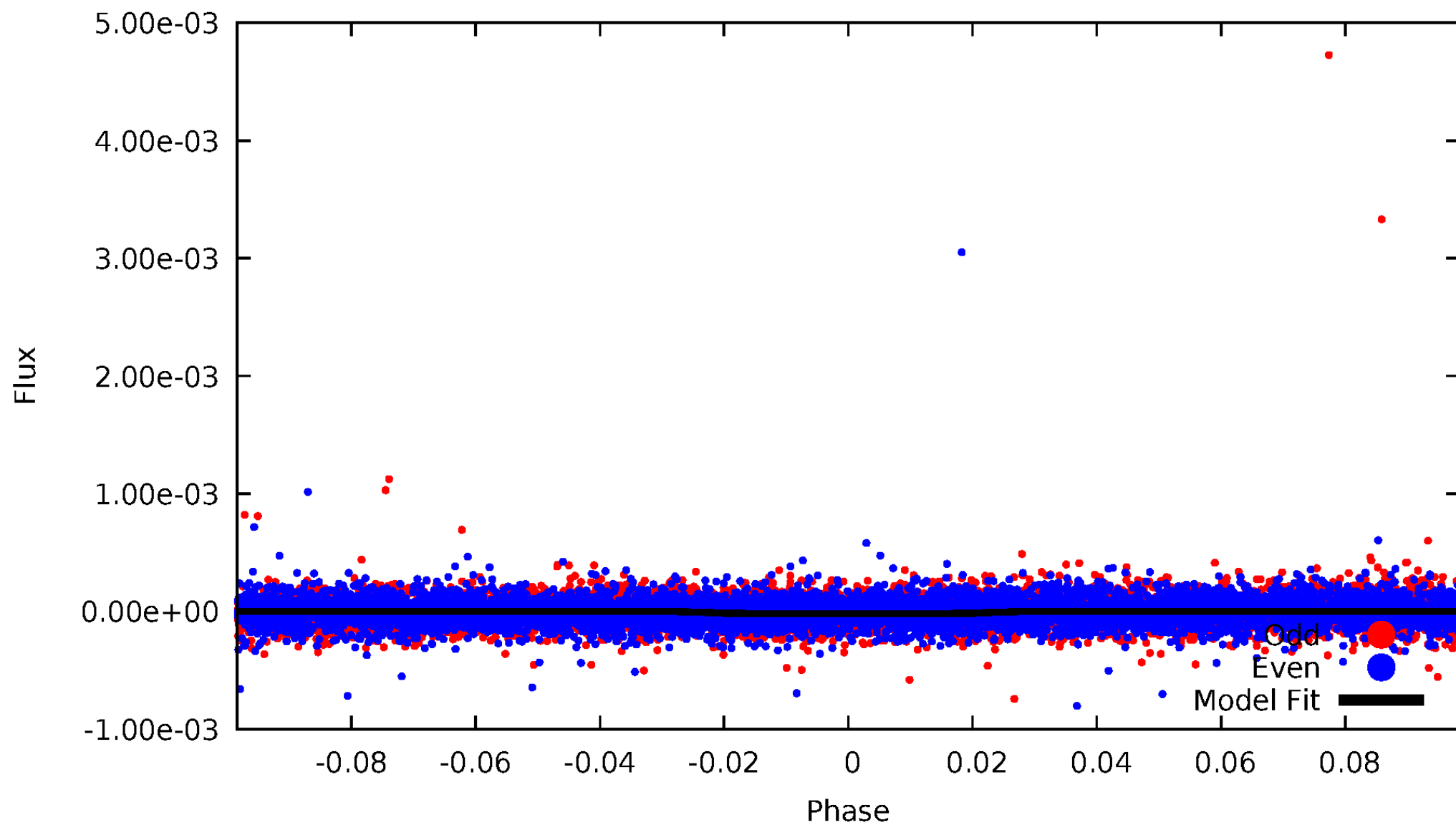
TCE 004141670-01





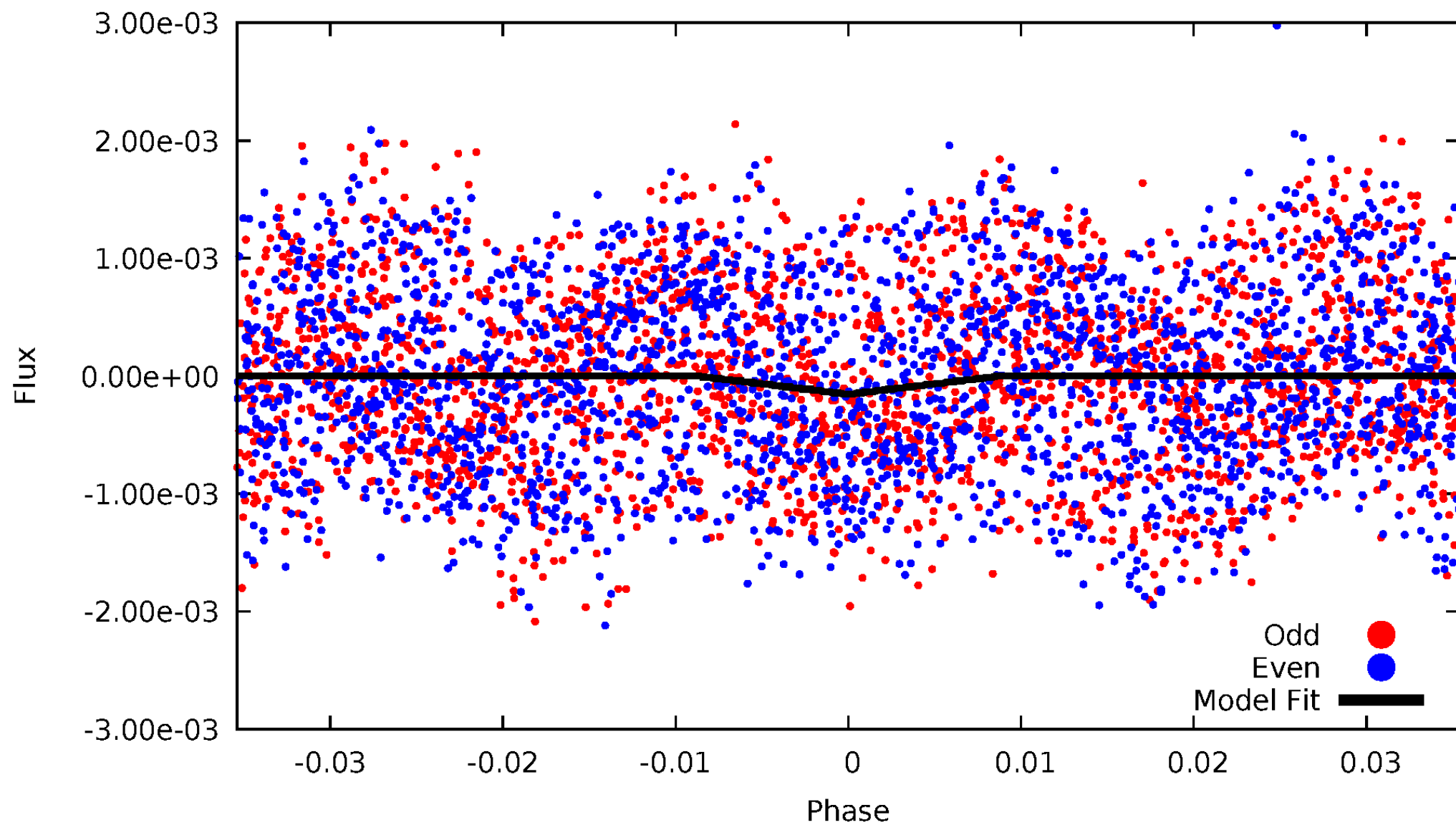
# DV Odd/Even

TCE 004141670-01



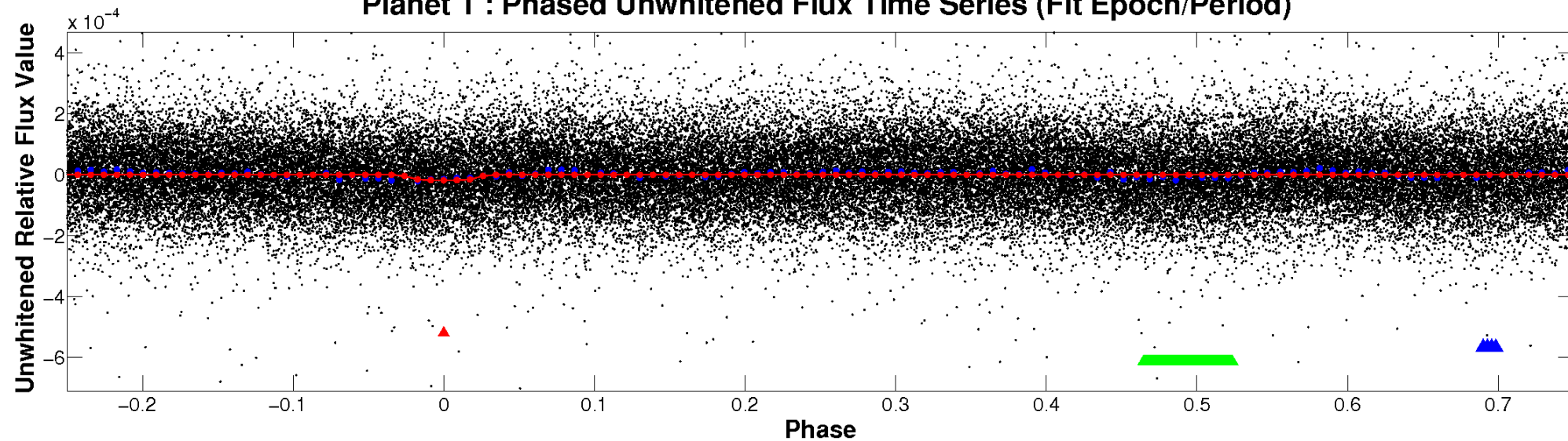
# ALT Odd/Even

TCE 004141670-01

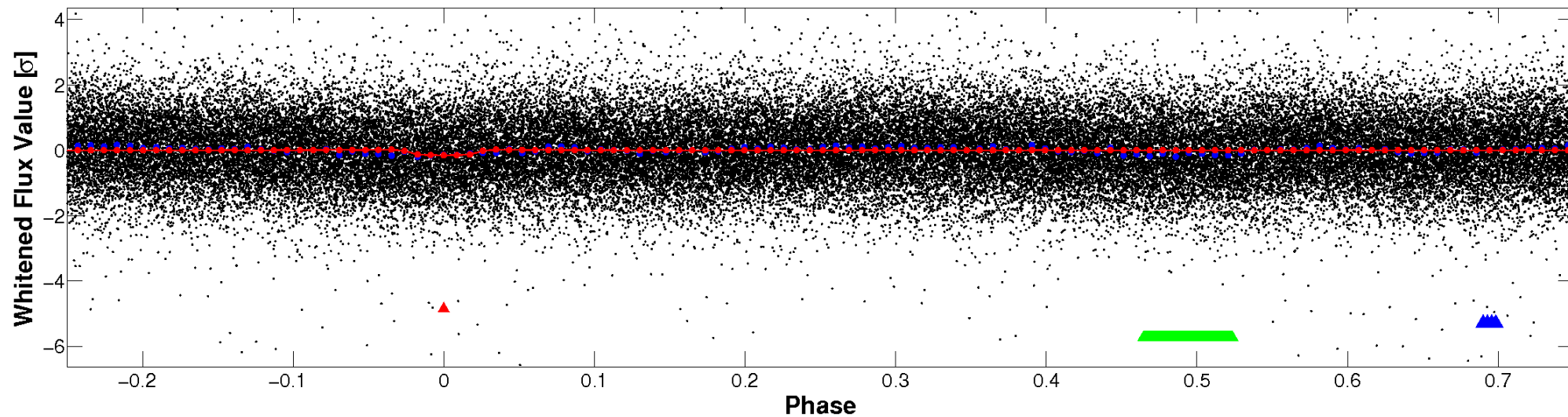


# Non-Whitened Vs. Whitened Light Curve

**Planet 1 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)**

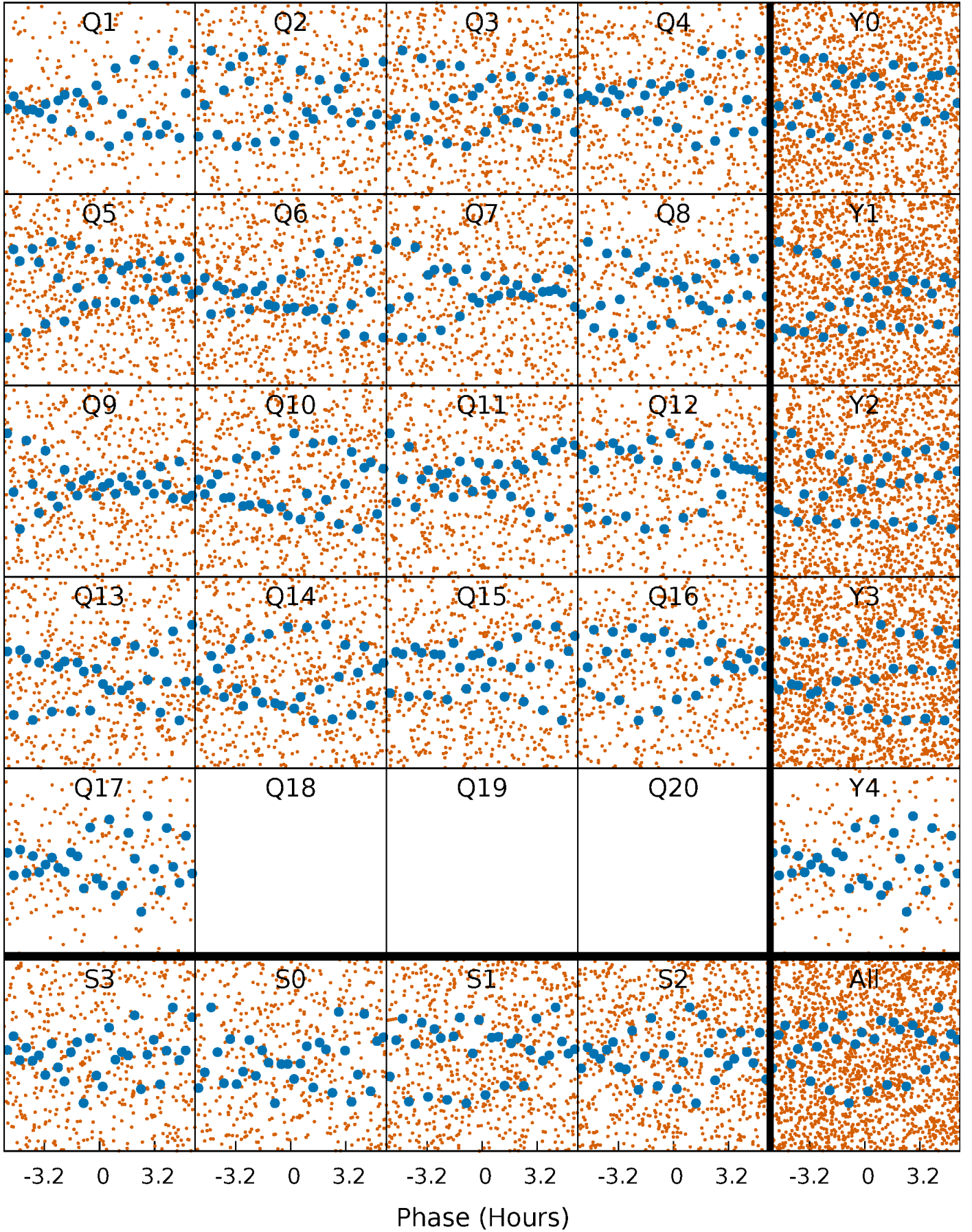


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

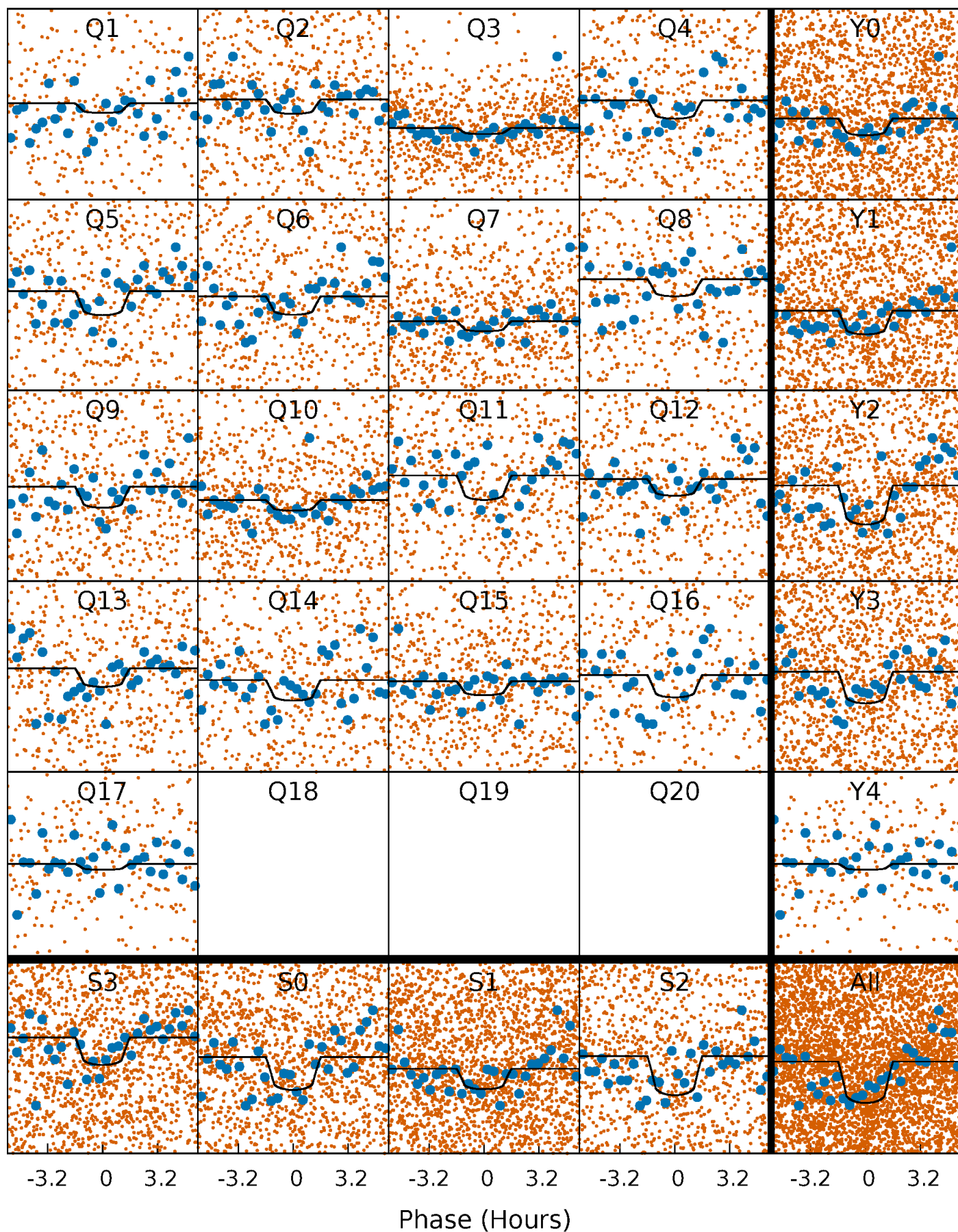
TCE 004141670-01   P= 2.354437 Days    $T_0=132.171153$  (BKJD)





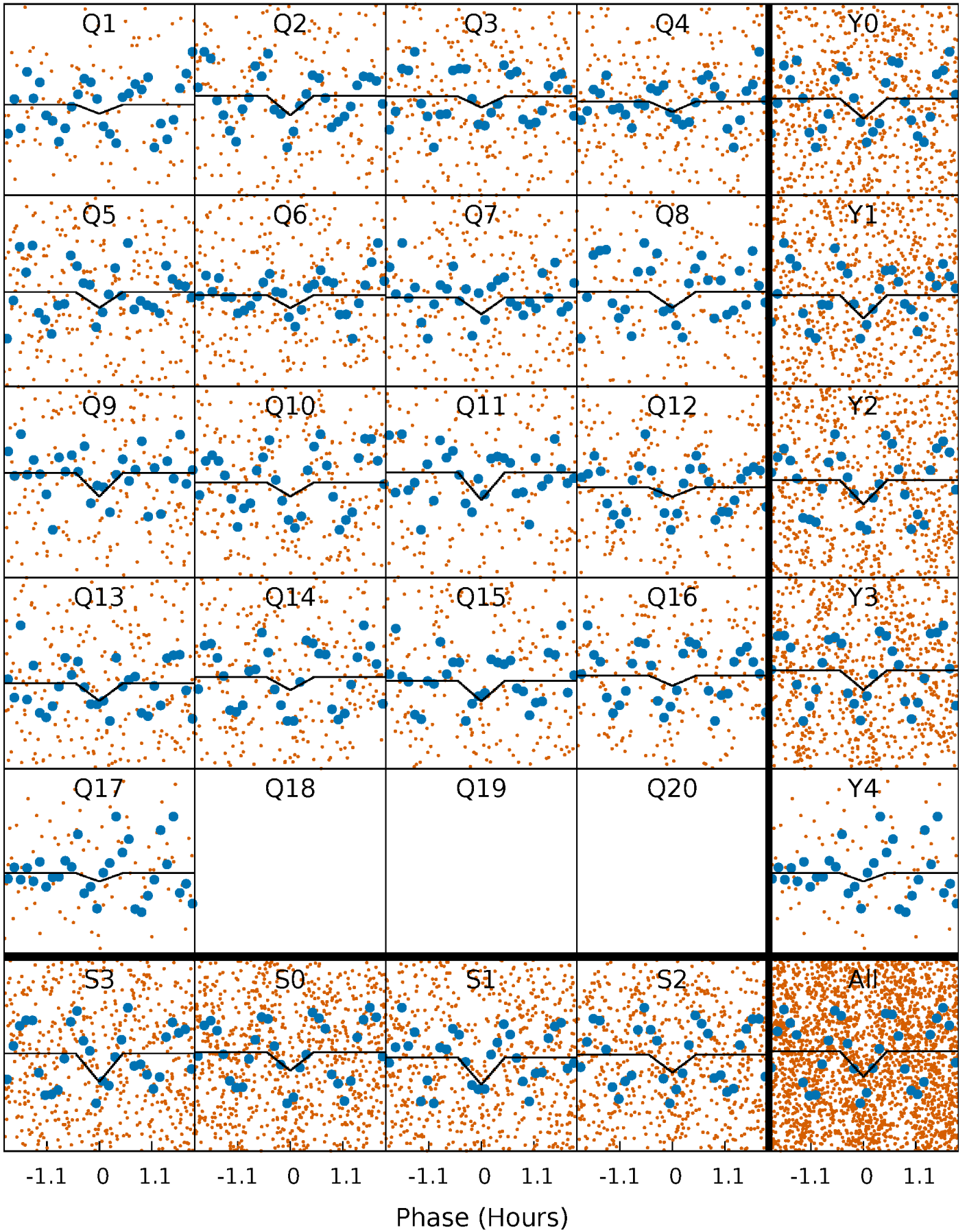
# DV Quarter-Phased Transit Curves

TCE 004141670-01 P= 2.354437 Days  $T_0=132.171153$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

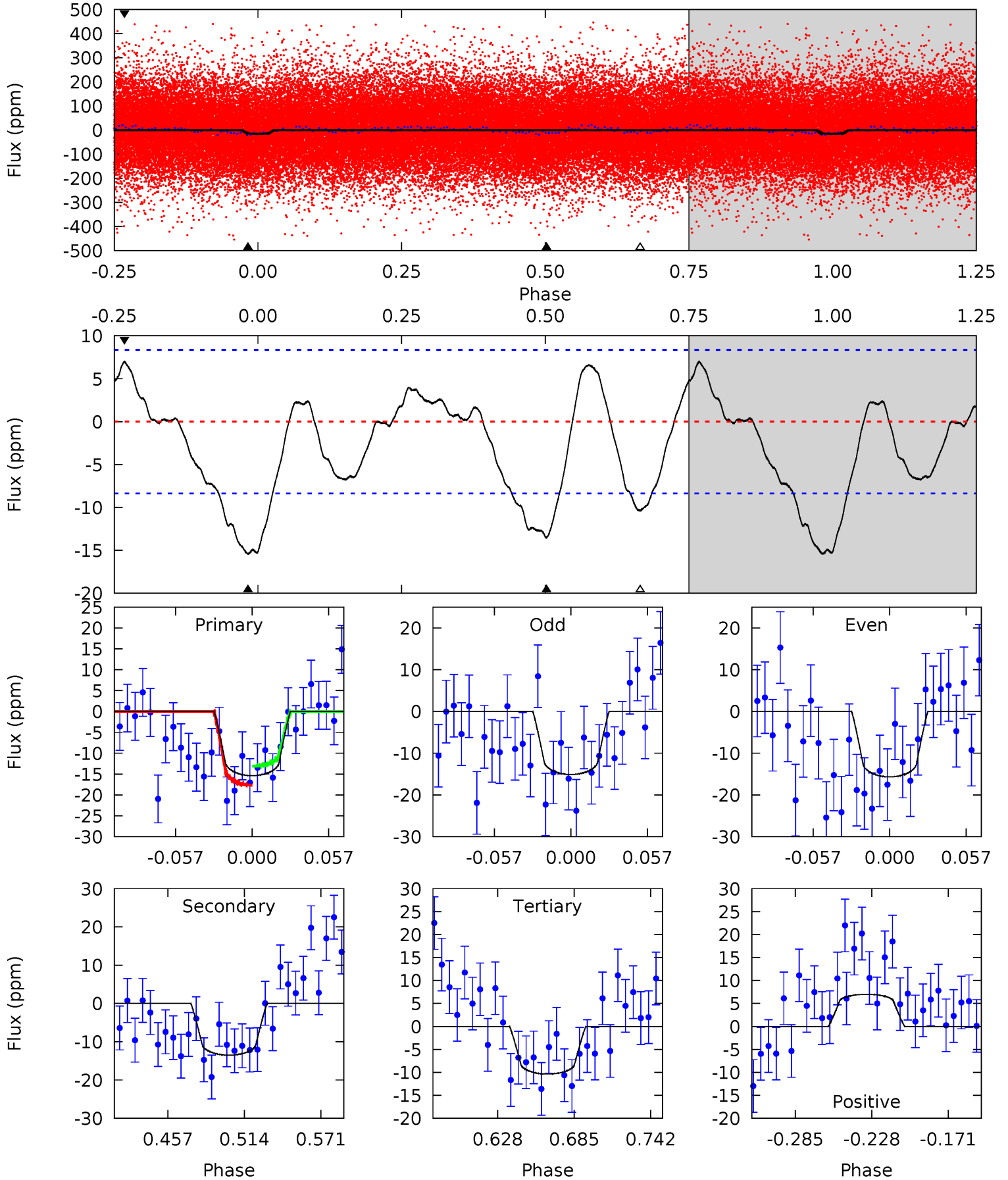
TCE 004141670-01 P= 2.354364 Days  $T_0=132.180310$  (BKJD)



# DV Model-Shift Uniqueness Test

004141670-01, P = 2.354437 Days, E = 129.816716 Days

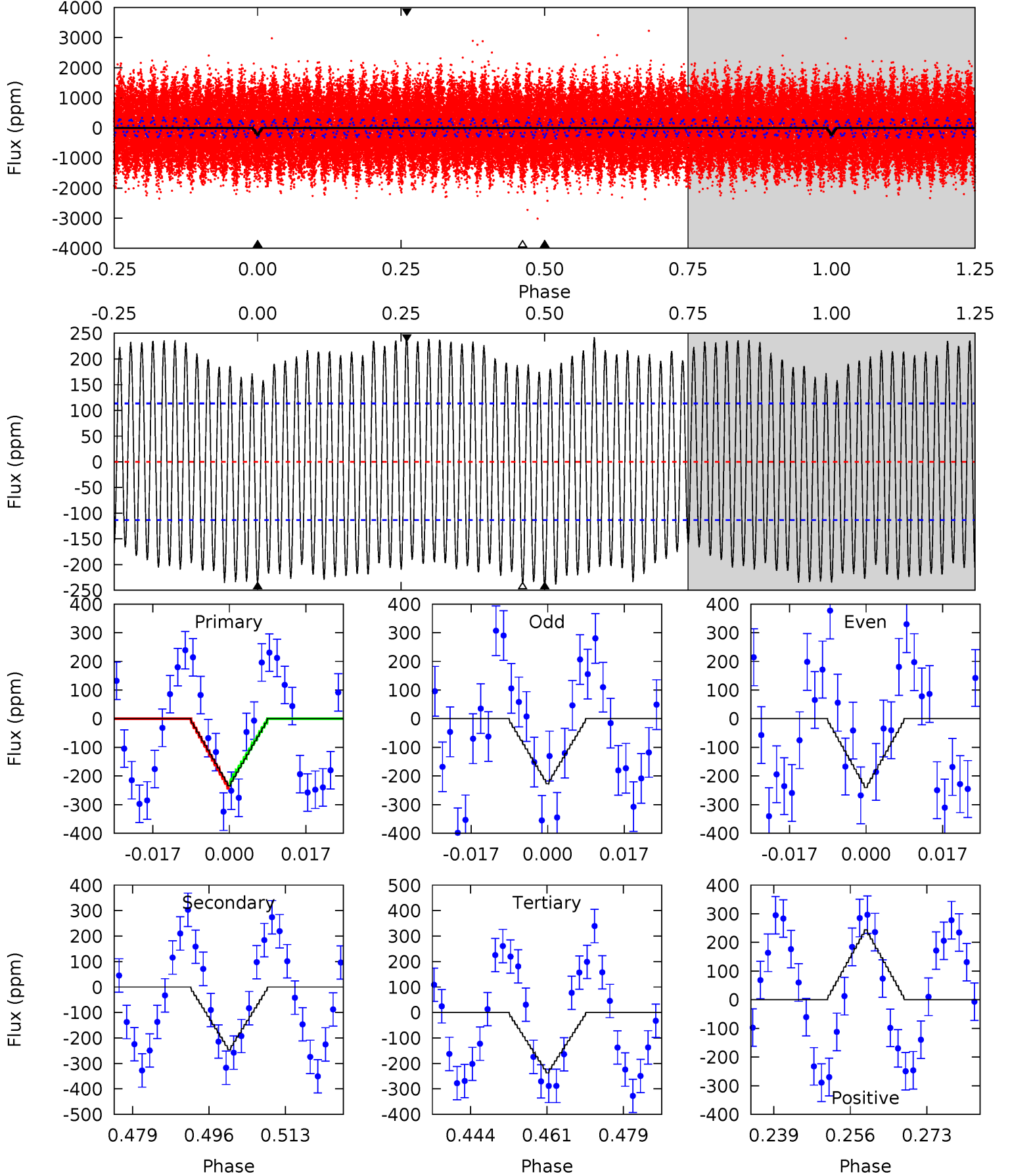
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.61	7.56	5.80	3.91	4.68	1.90	2.45	2.81	4.70	1.76	3.65	0.16	0.95	0.31	1.27



# Alt Model-Shift Uniqueness Test

004141670-01, P = 2.354364 Days, E = 129.825946 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
10.2	10.7	10.3	10.6	4.92	2.38	6.52	-0.13	-0.44	0.39	0.09	0.30	0.77	0.50	0.37





### Stellar Parameters For KIC 004141670

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (g \cdot \text{cm}^{-3})$
	$7181^{+199}_{-324}$	$4.162^{+0.153}_{-0.187}$	$-0.260^{+0.250}_{-0.350}$	$1.617^{+0.482}_{-0.351}$	$1.388^{+0.205}_{-0.228}$	$0.463^{+0.359}_{-0.234}$
	+3%/-5%	+4%/-4%	+96%/-135%	+30%/-22%	+15%/-16%	+78%/-51%
Source	KIC0	KIC0	KIC0	DSEP		

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology  
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

### Secondary Eclipse Parameters for KIC 004141670-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-14 \pm 2$	$0.82^{+0.31}_{-0.28}$	$2868^{+213}_{-206}$	$6287^{+1711}_{-898}$	$16^{+23}_{-8}$
Alt.	$-246 \pm 23$	$2.24^{+0.45}_{-0.40}$	$2883^{+222}_{-204}$	$8148^{+885}_{-673}$	$40^{+19}_{-12}$

$T_{max}$  = Theoretical Maximum Planetary Temperature

$T_{obs}$  = Observed Planetary Temperature (Assuming  $A=0.3$ )

$A_{obs}$  = Observed Albedo (Assuming  $T=0$ )

If a secondary eclipse is present, the system is likely an EB if  $T_{obs} \gg T_{max}$  AND  $A_{obs} \gg 1.0$

## DV Centroid Data

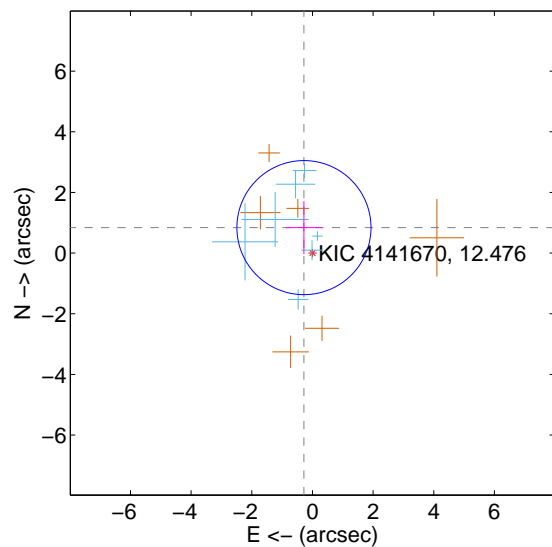
Supplemental centroid analysis for 004141670-01. Kepler magnitude: 12.48. Transit SNR 7.37

There are 7 quarters with good PRF difference image offsets

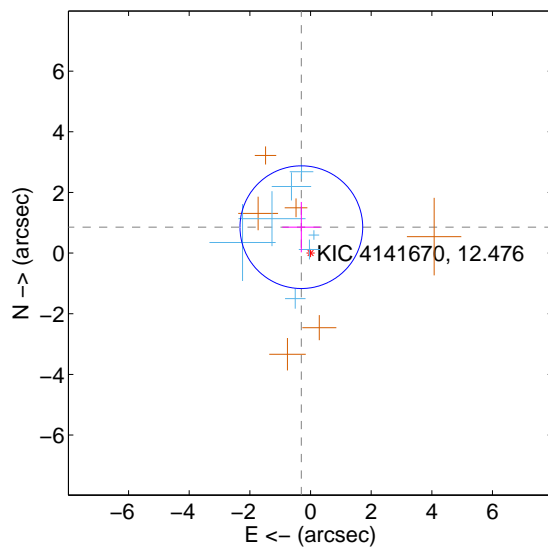
The direct PRF centroid is offset from the target star catalog position by about 0.05 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.886 \pm 0.737$	1.20	$0.280 \pm 0.600$	$0.840 \pm 0.873$
PRF-fit source offset from KIC position	$0.907 \pm 0.674$	1.34	$0.303 \pm 0.627$	$0.855 \pm 0.831$
photometric centroid source offset	$2.28 \pm 1.46$	1.57	$1.62 \pm 1.36$	$-1.61 \pm 1.55$

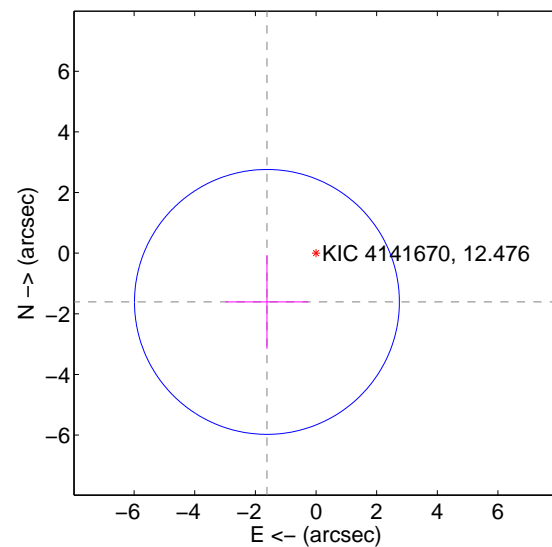
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

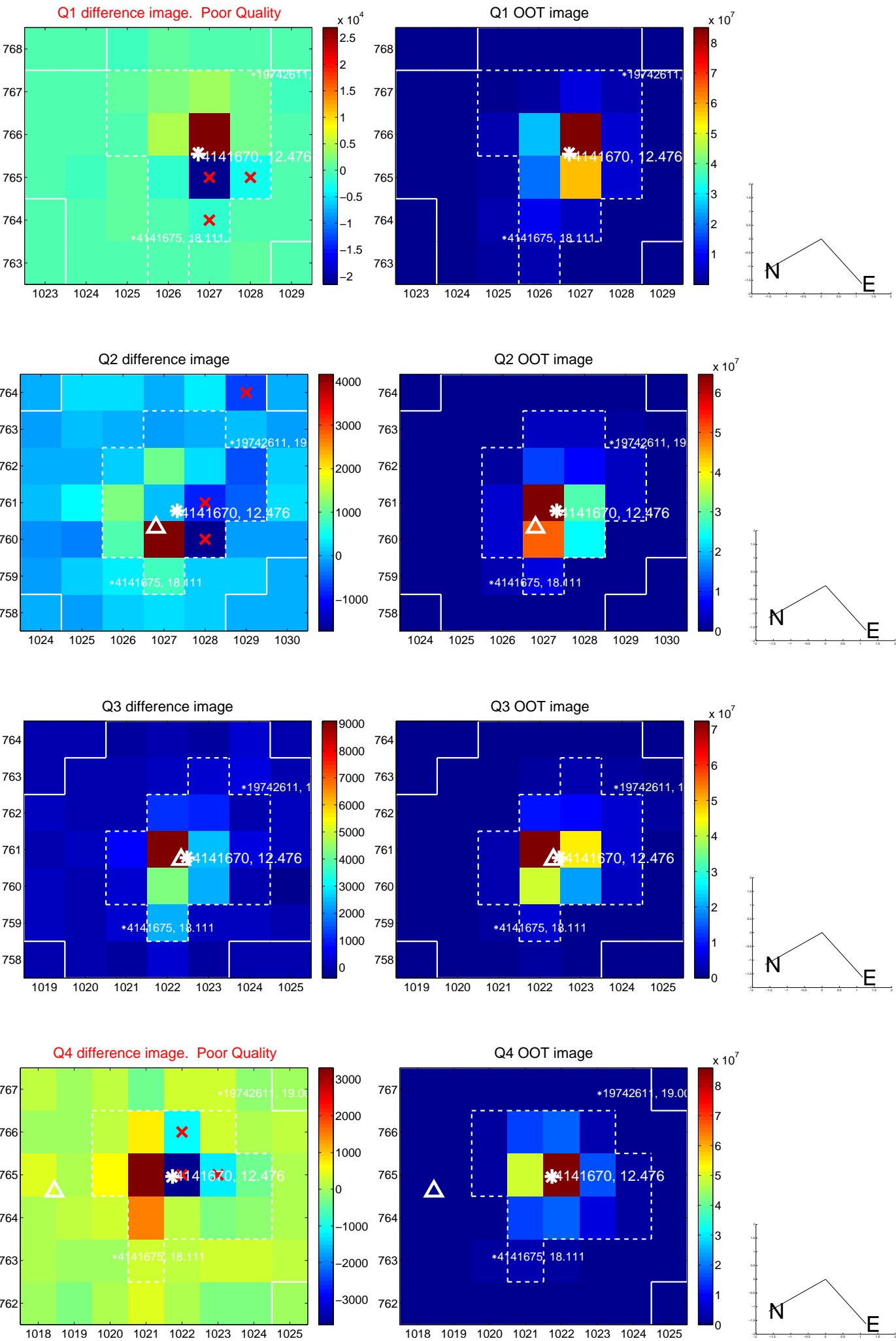


offset from photometric centroids

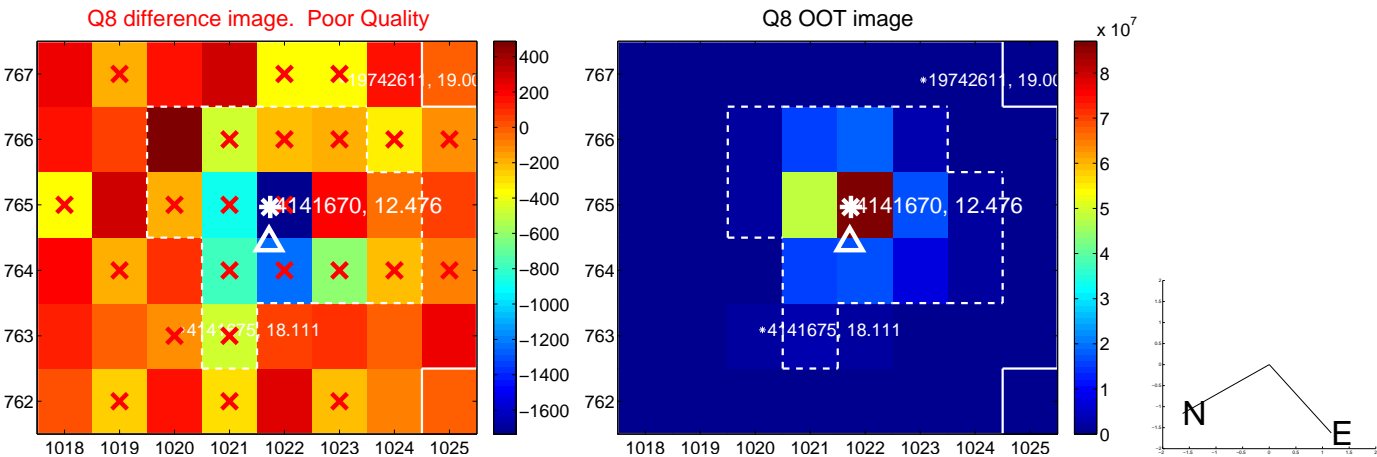
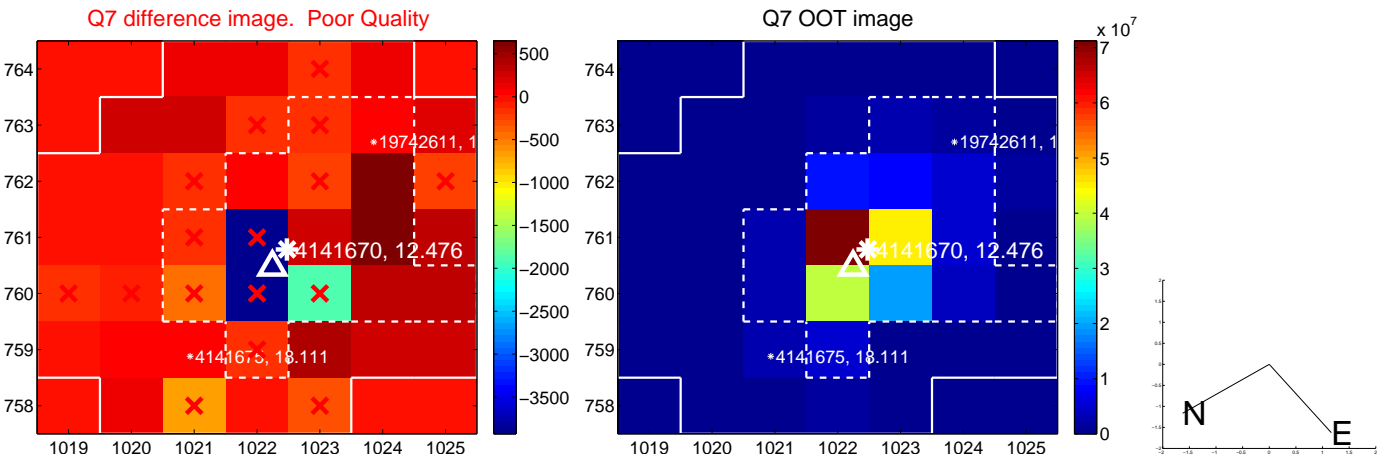
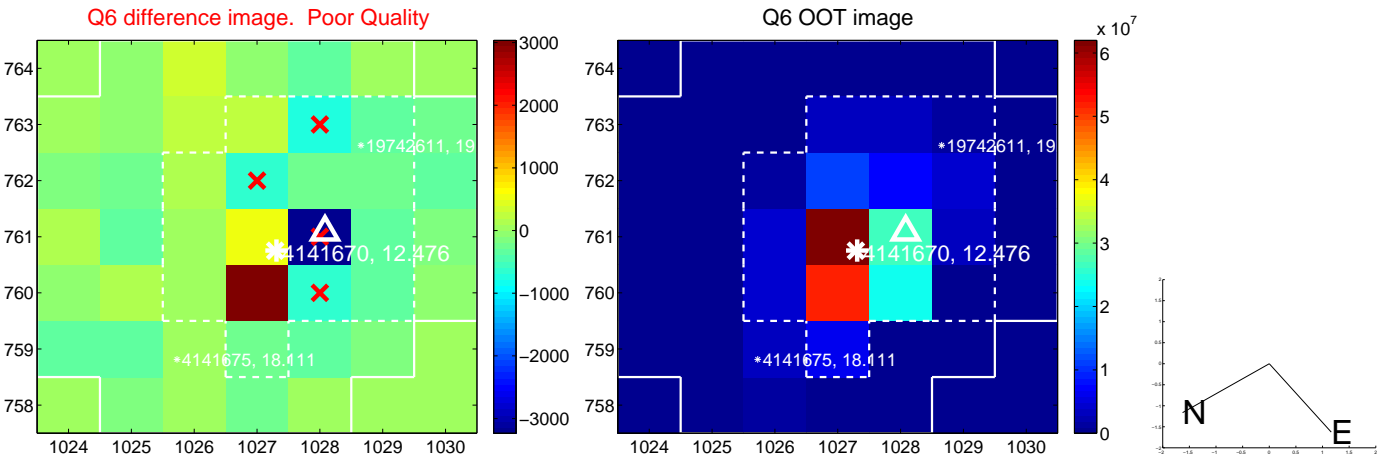
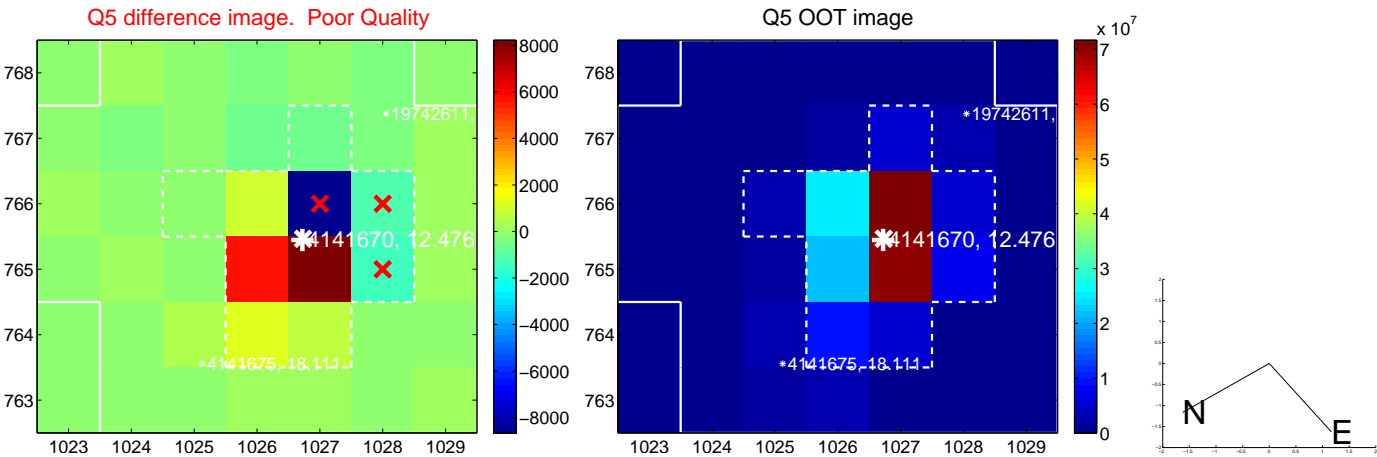


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . Red \*: target star. Blue \*: Other stars. Text next to a star gives its KIC ID and kepmag. KIC IDs > 15,000,000 are from the UKIRT catalog.

white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

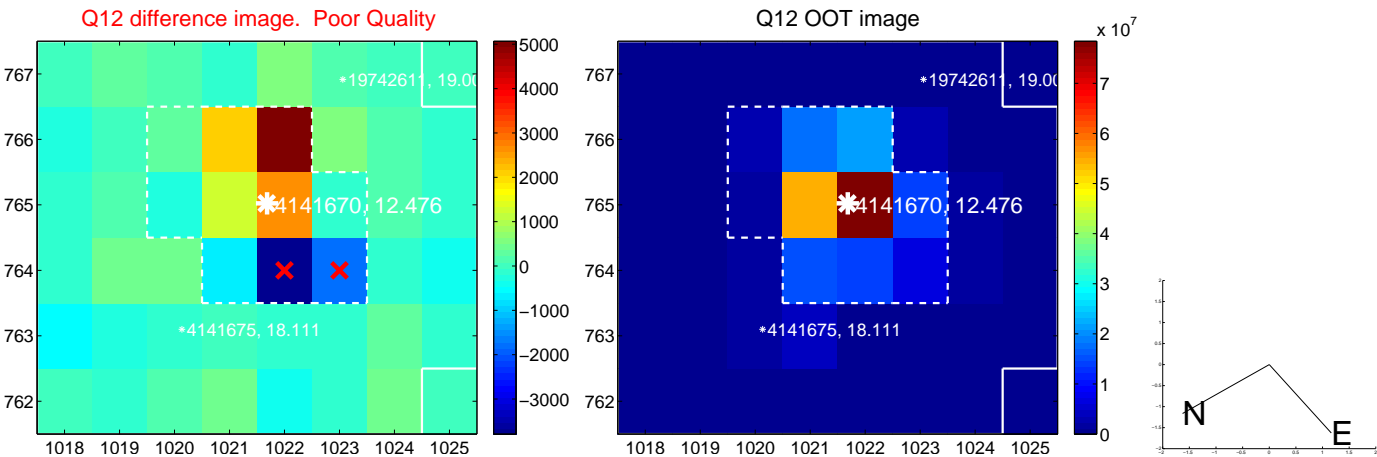
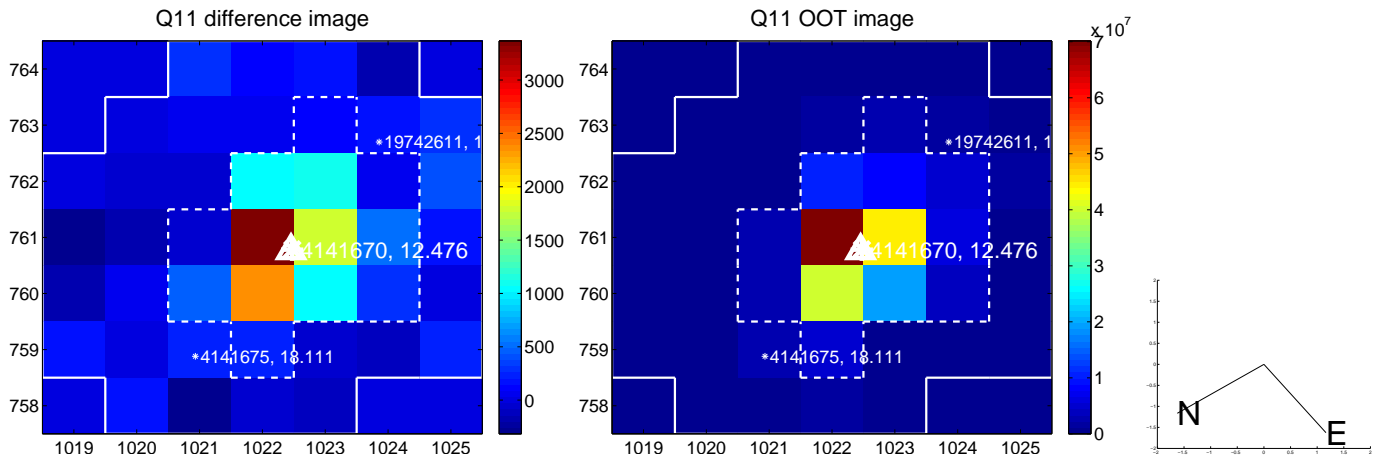
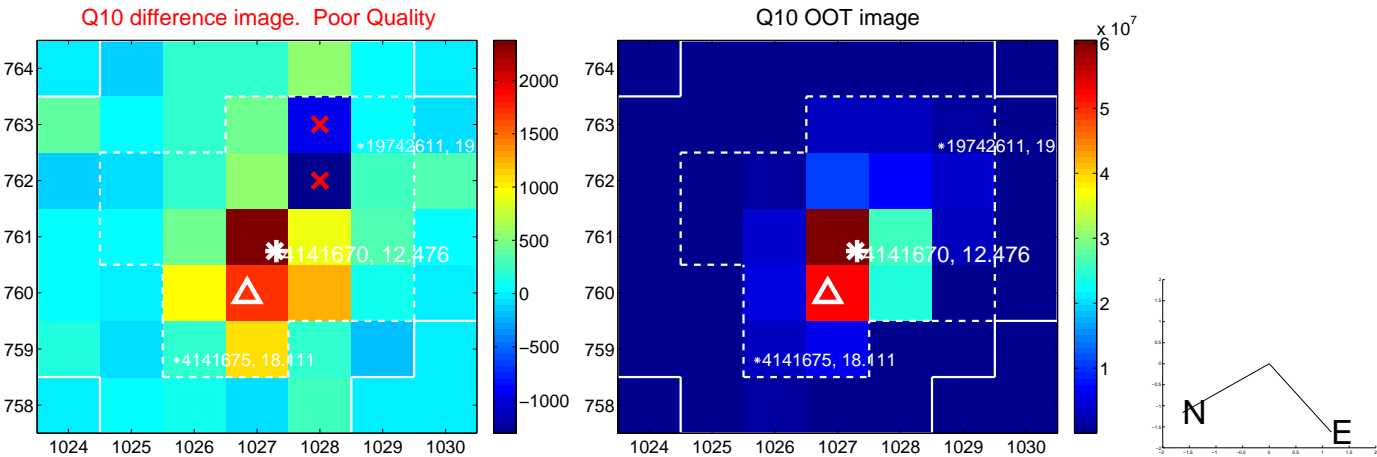
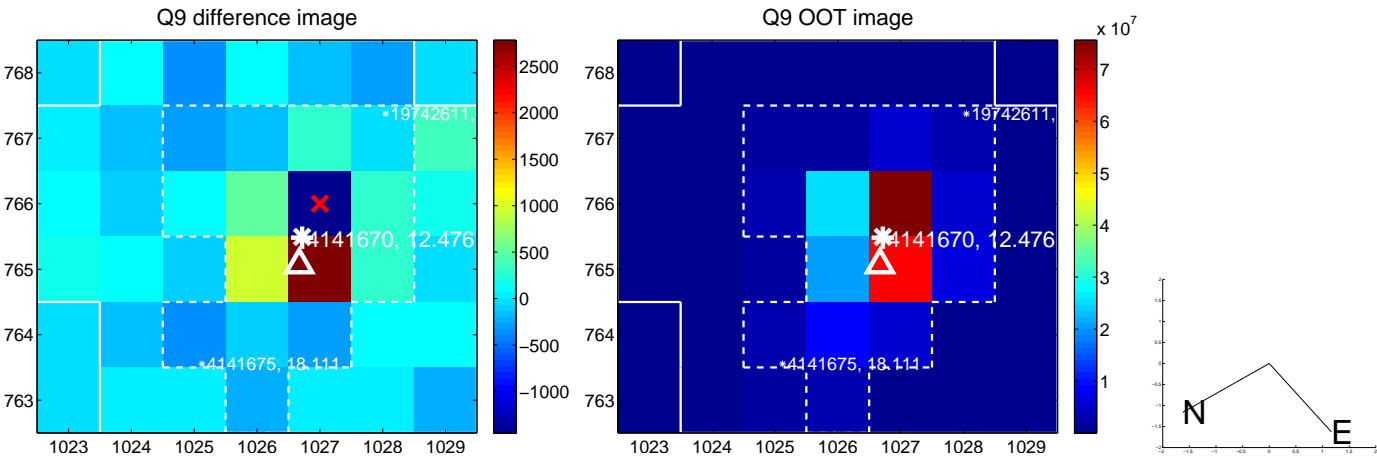


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

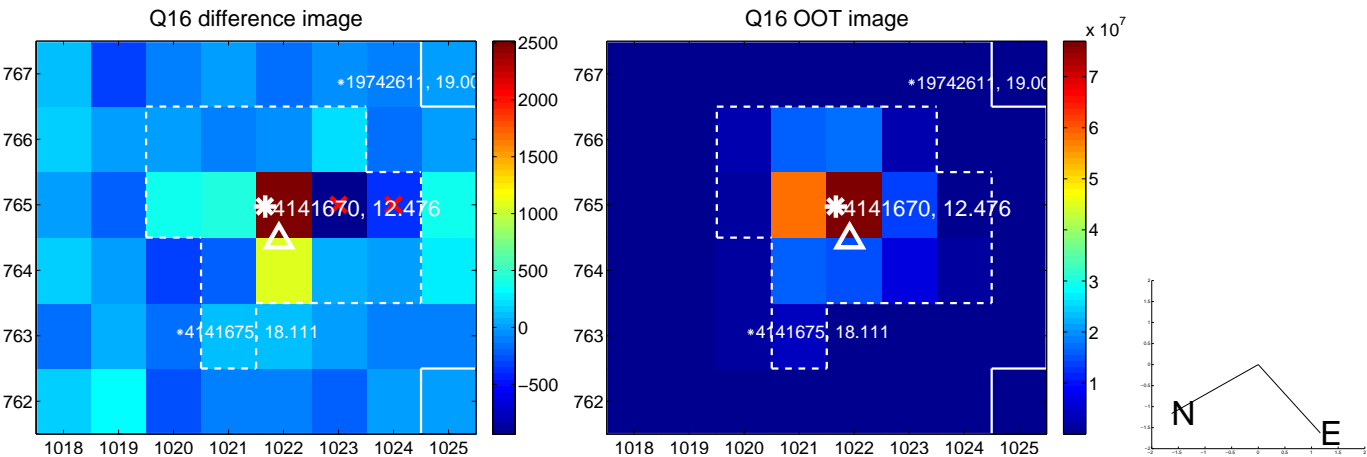
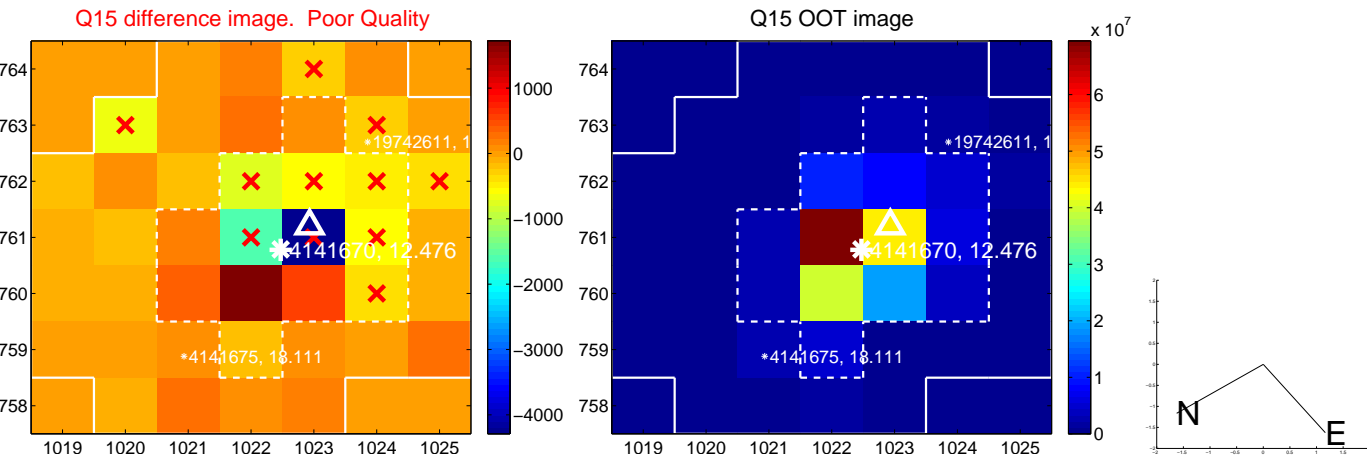
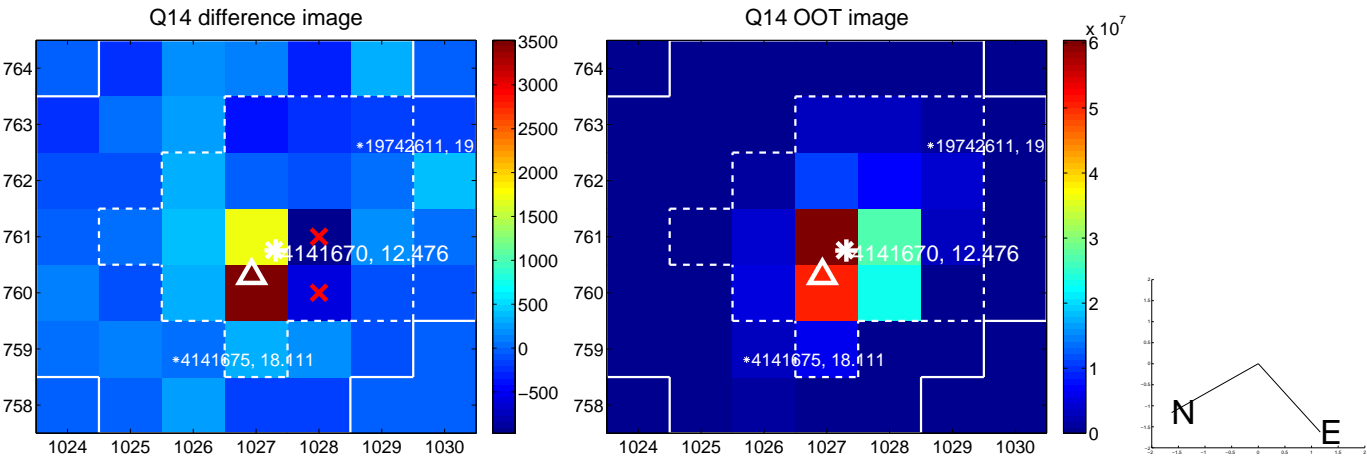
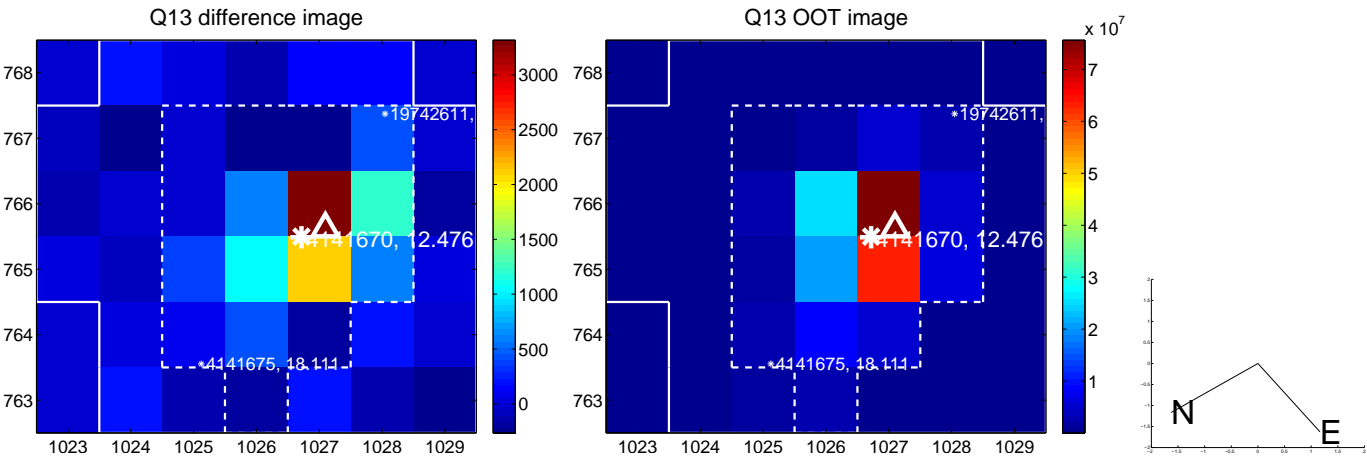




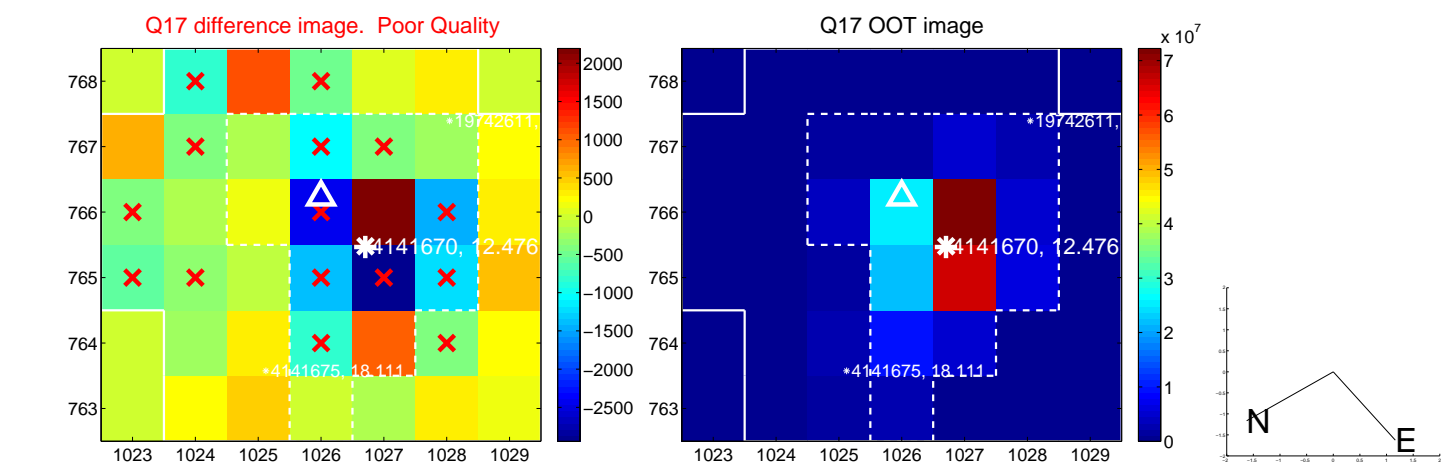
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



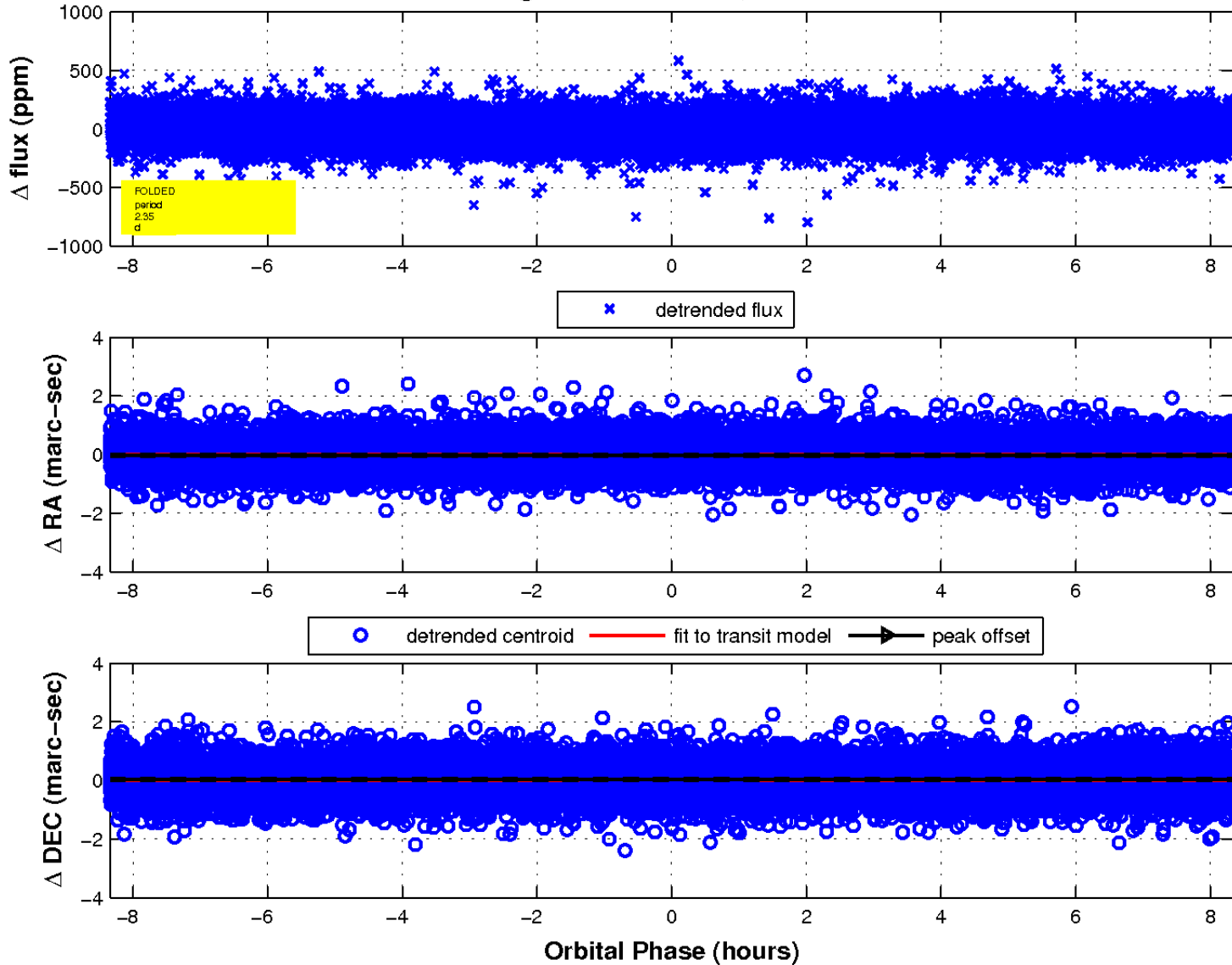
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

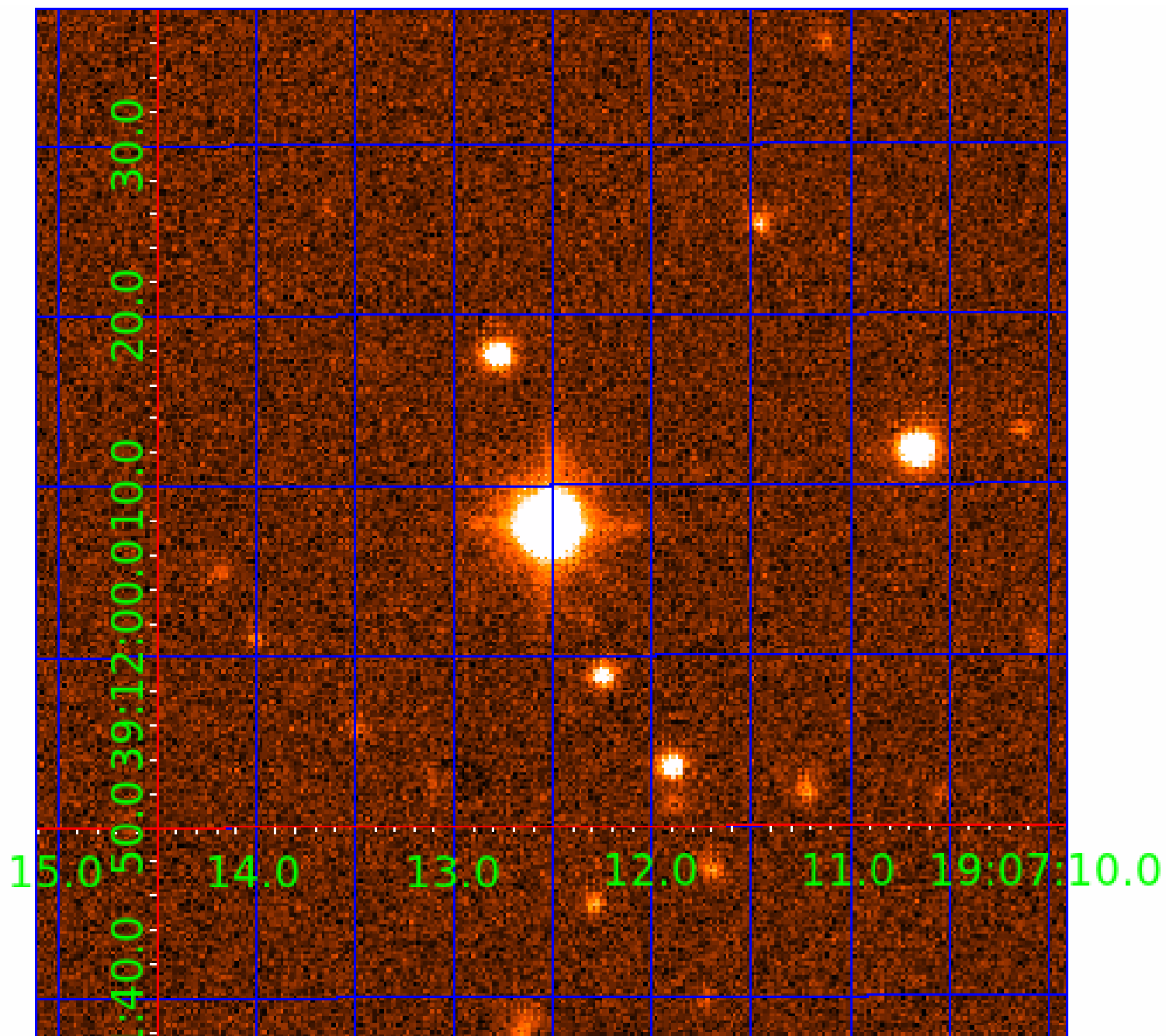


fluxWeightedCentroids, Planet 1 of 3



UKIRT Image

Declination





# KIC 004141670

## Q1-17 DR25 TCE Parameters

TCE	Run Type	KOI?	Period (Days)	Epoch (BKJD)	Depth (ppm)	Duration (Hours)	MES	SNR	$R_{\star}$ ( $R_{\odot}$ )	$T_{\star}$ (K)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004141670-01	OBS	No	2.354437	132.171153	18.3	2.780	9.3	7.4	1.62	7181	0.80	4177.58
004141670-02	OBS	No	421.437706	305.689514	182.9	26.349	27.4	7.1	1.62	7181	2.21	4.14
004141670-03	OBS	No	2.354663	133.264643	20.2	3.699	10.6	9.3	1.62	7181	0.84	4177.05

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004141670-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004141670-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004141670-03	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD

**Notes:** OBS = Observed. INJ = Injected. INV = Inverted. SCR = Scrambled.

N = Not Transit-Like. S = Stellar Eclipse. C = Centroid Offset. E = Ephemeris Match.

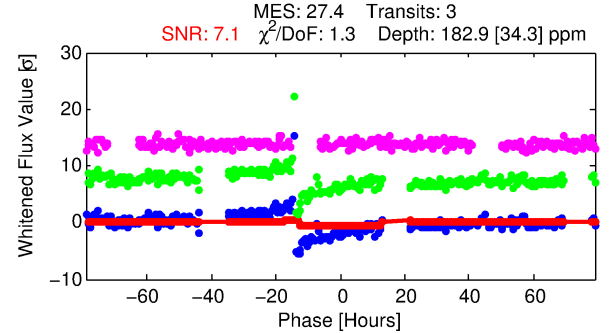
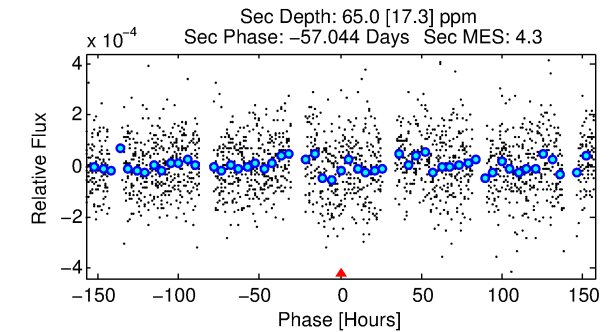
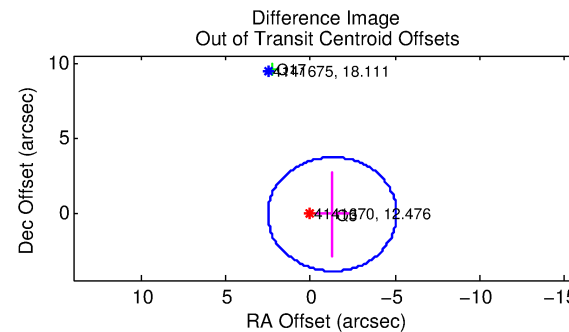
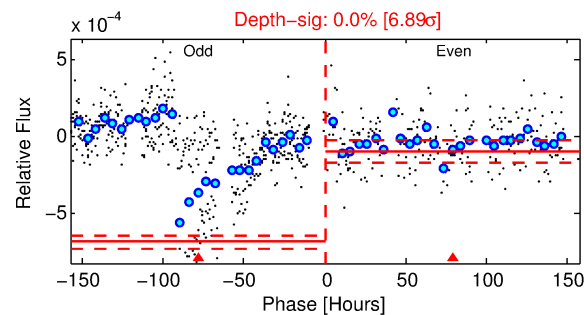
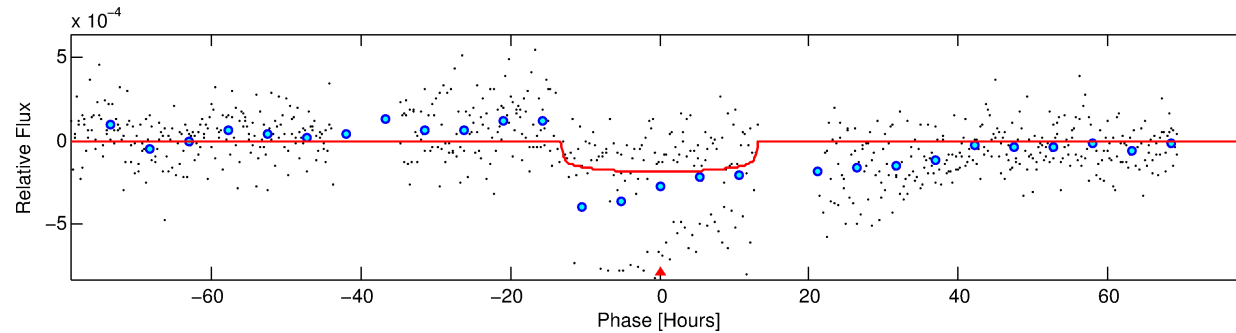
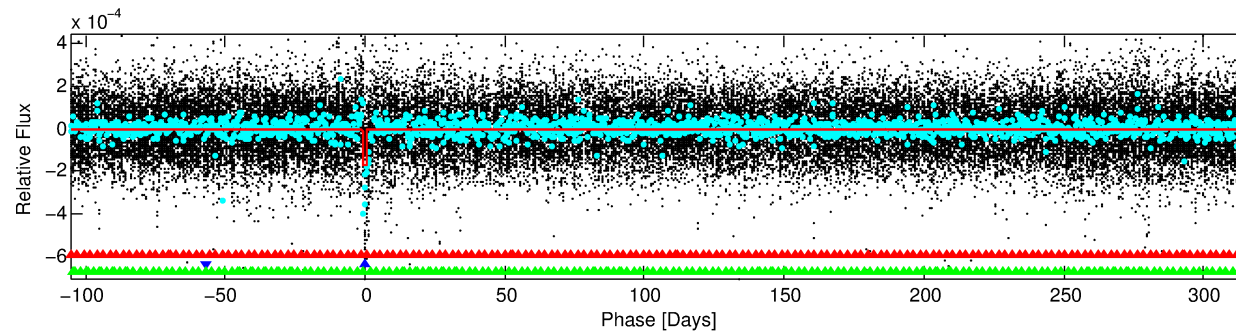
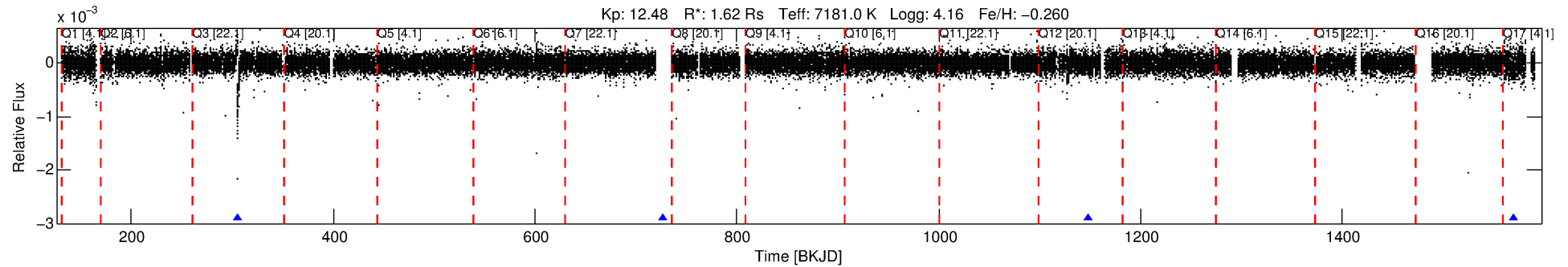
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 004141670-02

No Significant Match Found

# DV One-Page Summary

KIC: 4141670 Candidate: 2 of 3 Period: 421.438 d



## DV Fit Results:

Period = 421.43771 [0.01390] d  
Epoch = 305.6895 [0.0323] BKJD  
Rp/R\* = 0.0125 [0.0145]  
a/R\* = 123.37 [838.89]  
b = 0.08 [88.36]  
Seff = 4.14 [1.63]  
Teq = 364 [36] K  
Rp = 2.21 [2.64] Re  
a = 1.2265 [0.3007] AU  
Ag = 10972.32 [25738.27] [0.43 $\sigma$ ]  
Teffp = 5756 [3348] K [1.61 $\sigma$ ]

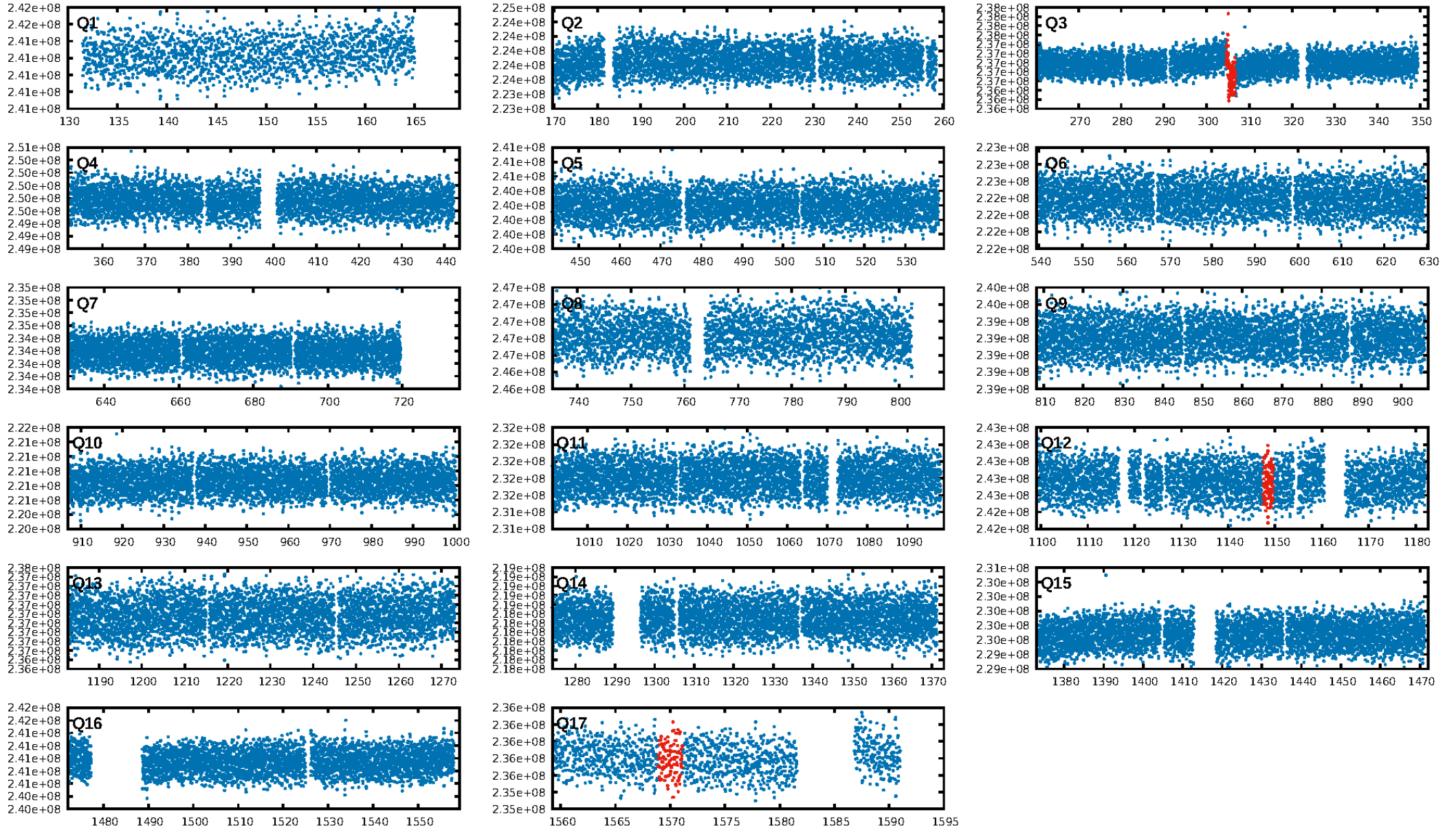
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [378.02 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 99.7%  
Bootstrap-pfa: 1.15e-59  
RollingBand-fgt: 1.00 [2/2]  
GhostDiagnostic-chr: -1.766  
Centroid-sig: 80.7%  
Centroid-so: 0.406 arcsec [0.47 $\sigma$ ]  
OotOffset-rm: 1.283 arcsec [1.01 $\sigma$ ]  
OotOffset-st: 0/1/0/1 [2]  
KicOffset-rm: 1.224 arcsec [1.01 $\sigma$ ]  
KicOffset-st: 0/1/0/1 [2]  
DiffImageQuality-fgm: 0.50 [1/2]  
DiffImageOverlap-fno: 0.00 [0/3]

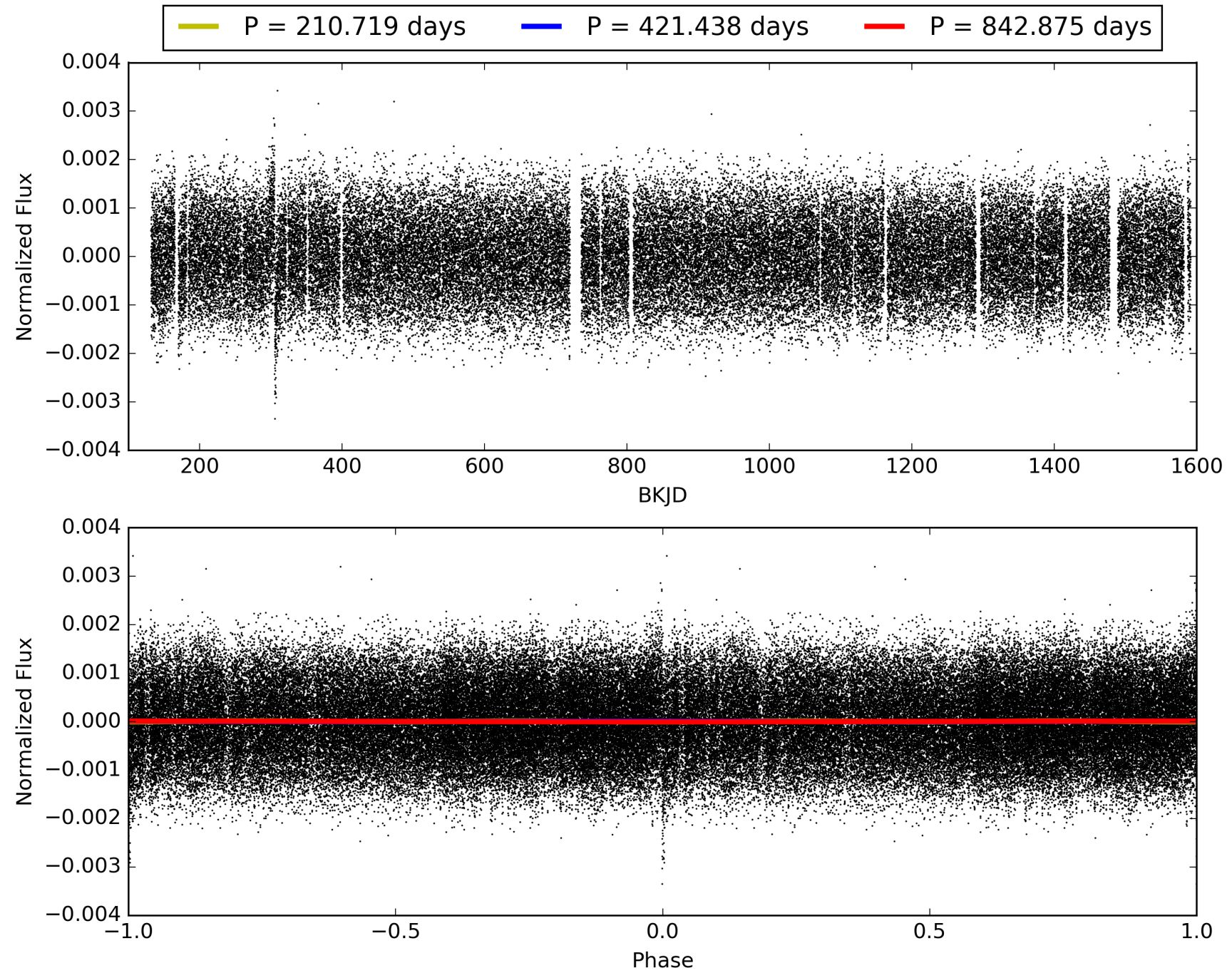
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 13:16:44 Z

This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 004141670-02, PDC Light Curves

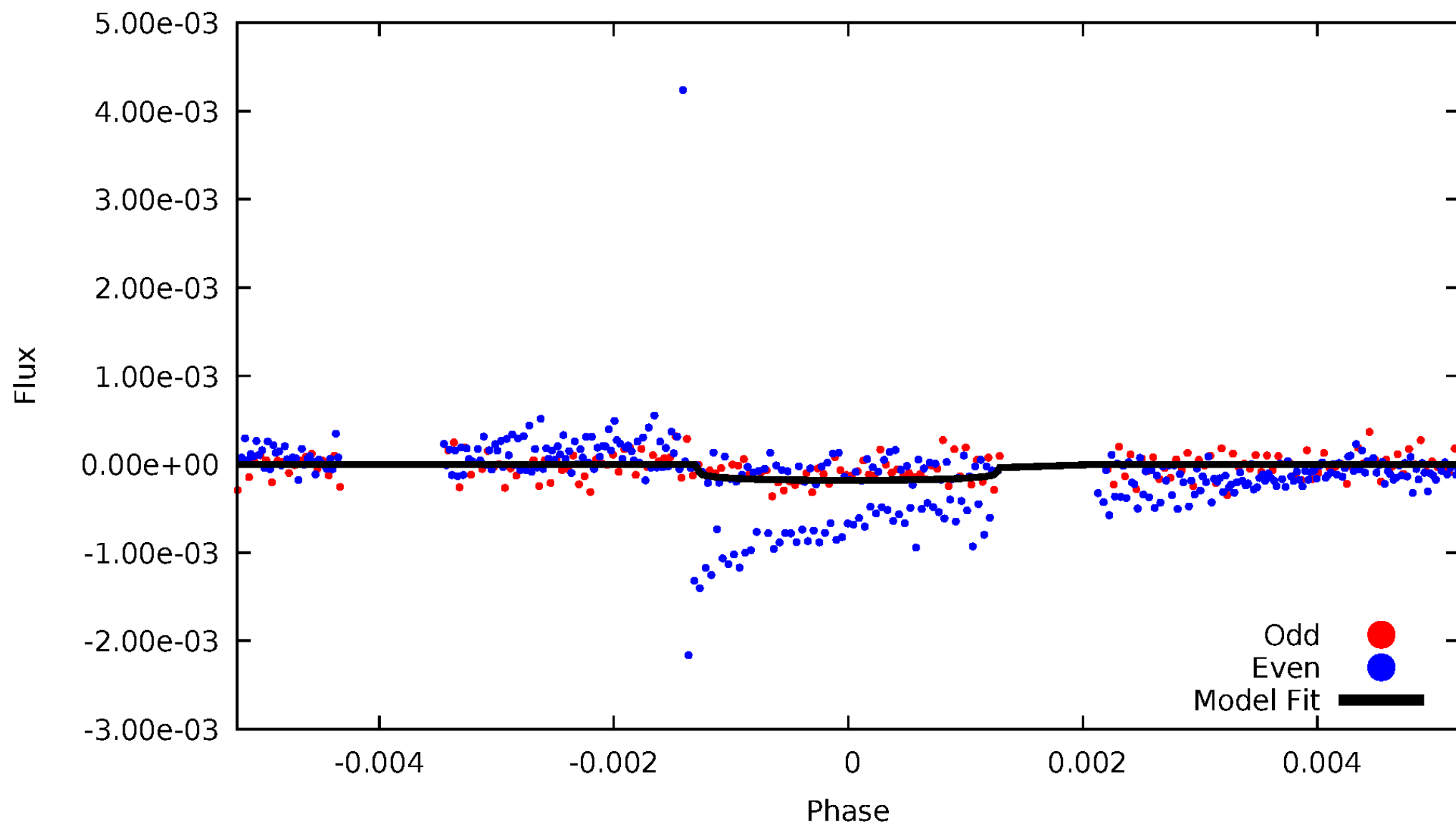


TCE 004141670-02



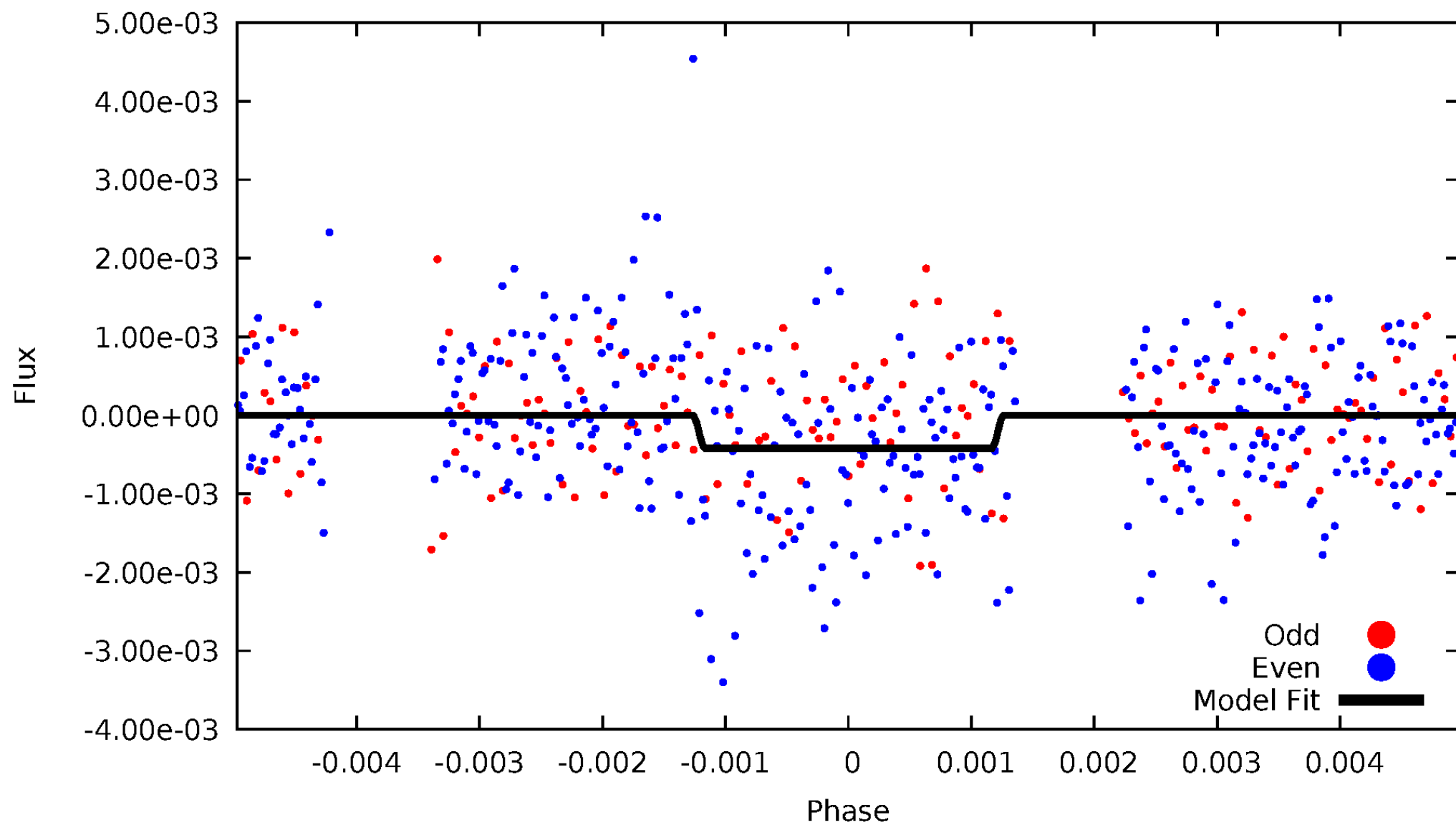
# DV Odd/Even

TCE 004141670-02



# ALT Odd/Even

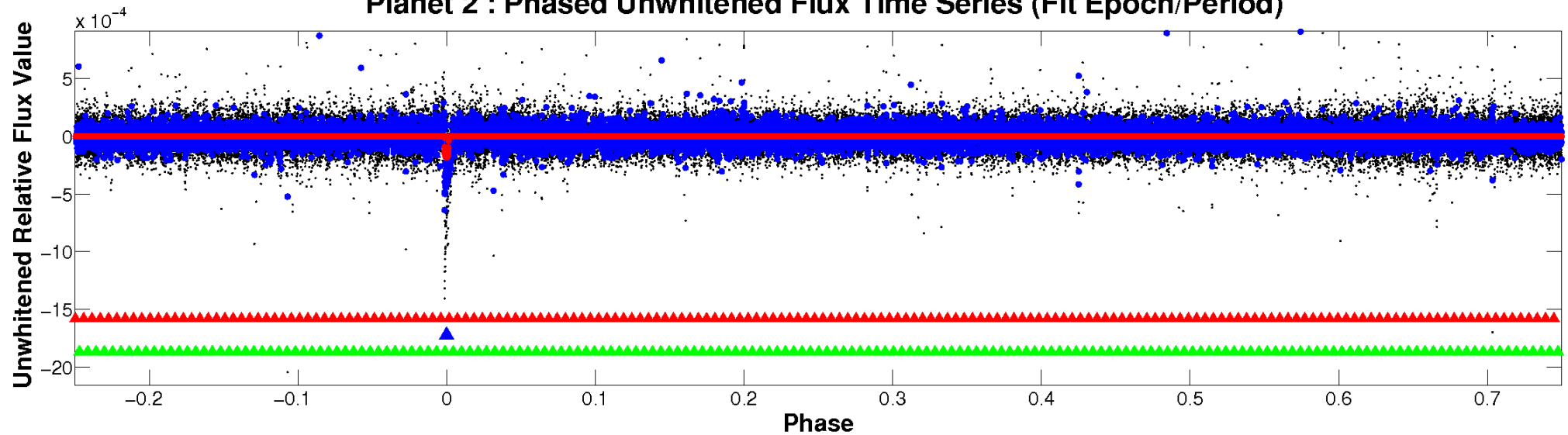
TCE 004141670-02



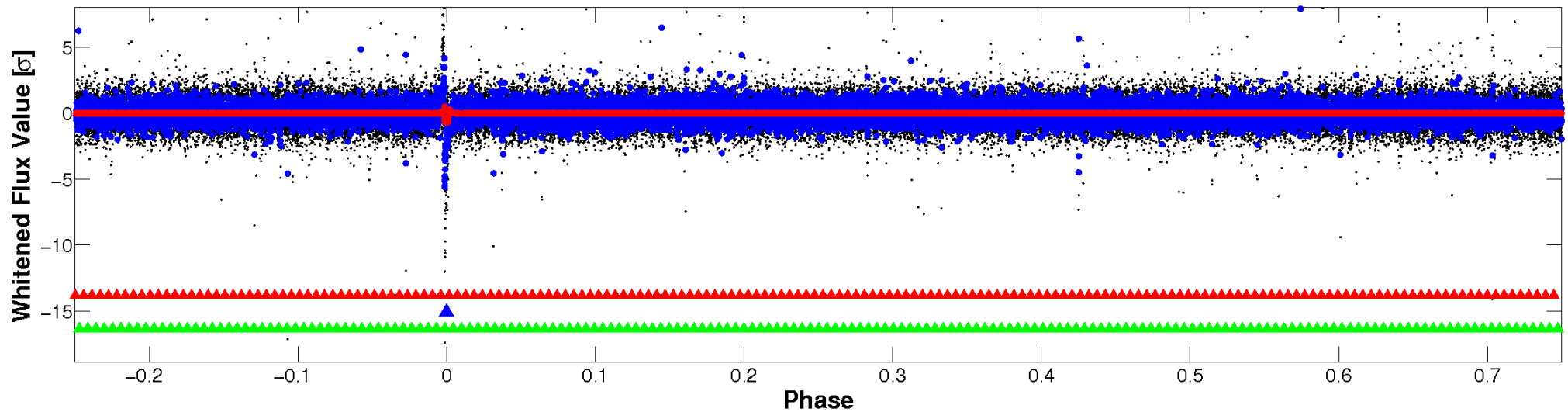


# Non-Whitened Vs. Whitened Light Curve

## Planet 2 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)



## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



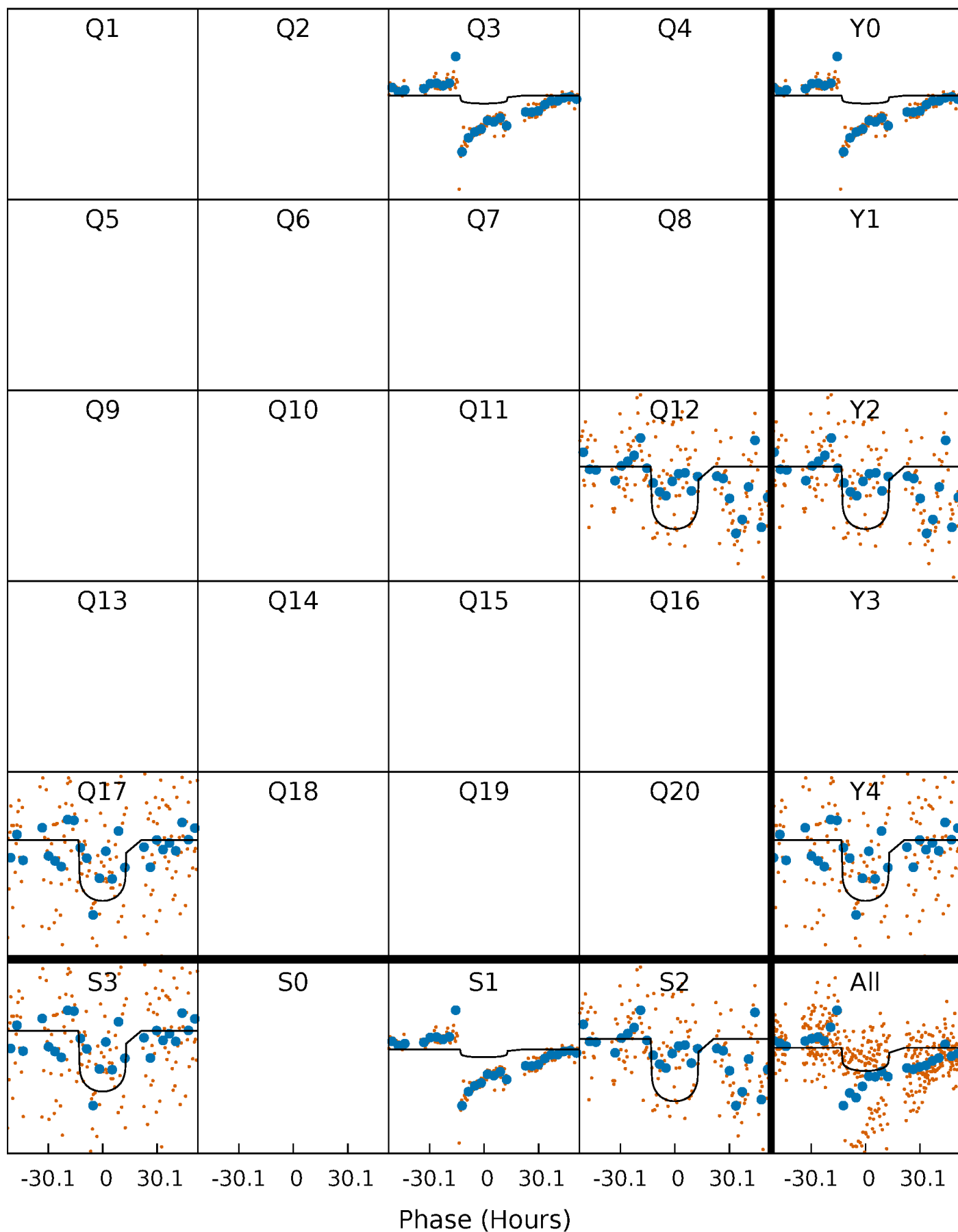
# PDC Quarter-Phased Transit Curves

TCE 004141670-02 P=421.437706 Days  $T_0=305.689514$  (BKJD)



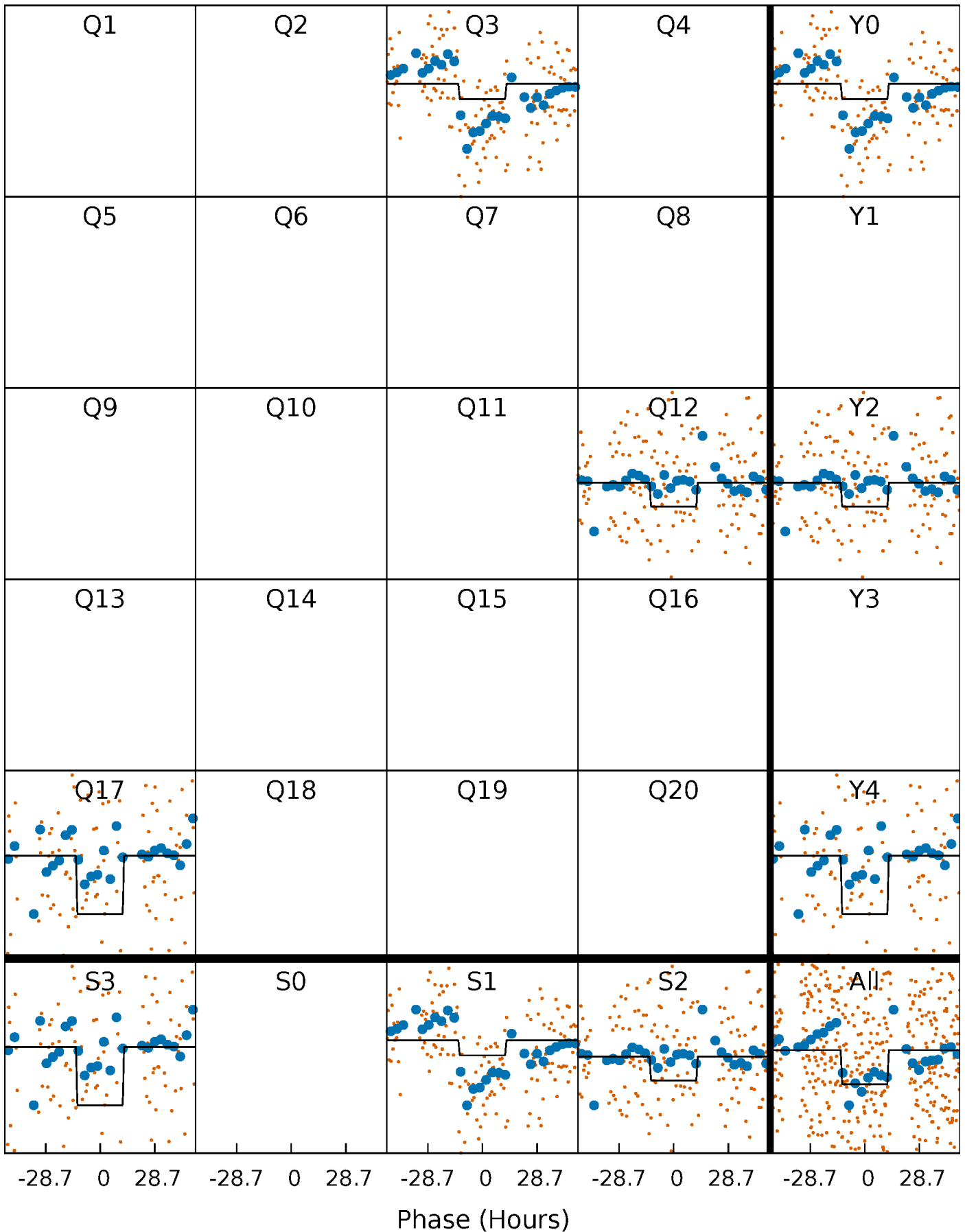
# DV Quarter-Phased Transit Curves

TCE 004141670-02     $P=421.437706$  Days     $T_0=305.689514$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

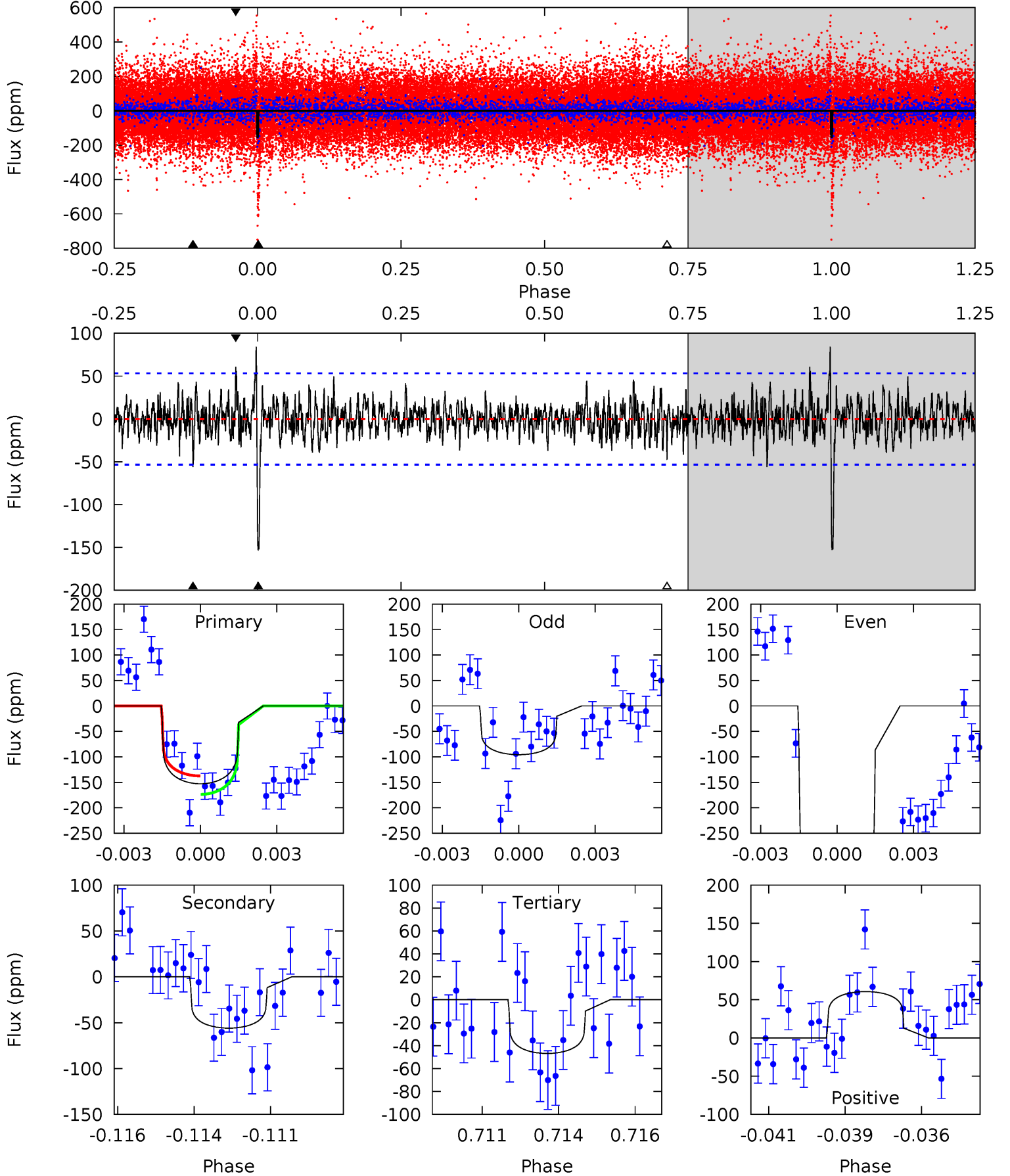
TCE 004141670-02     $P=421.455797$  Days     $T_0=305.626708$  (BKJD)



# DV Model-Shift Uniqueness Test

004141670-02, P = 421.437706 Days, E = 305.689514 Days

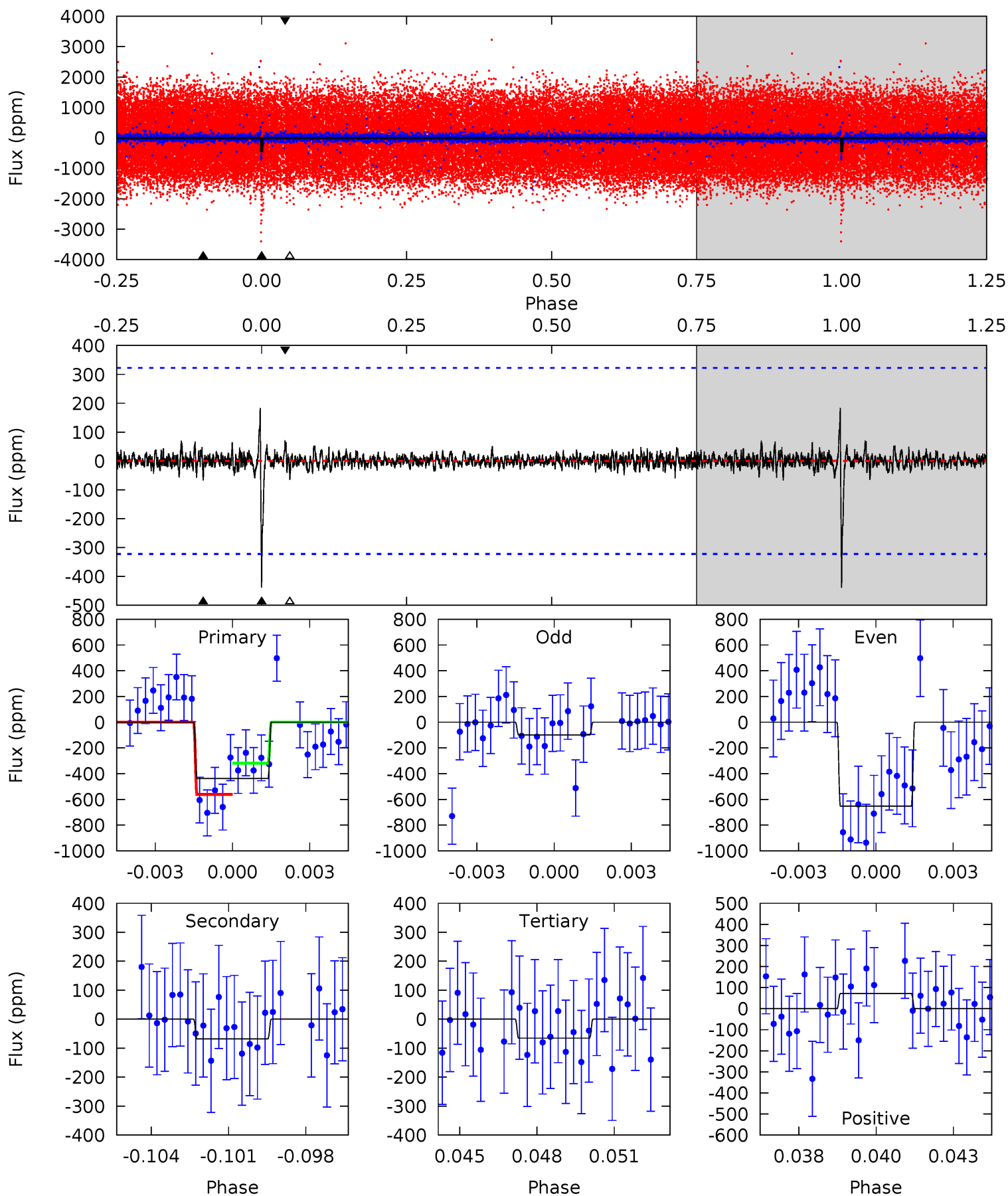
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
15.1	5.54	4.64	6.01	5.28	3.01	1.49	10.5	9.13	0.90	-0.47	16.4	3.31	0.36	1.79



# Alt Model-Shift Uniqueness Test

004141670-02, P = 421.455797 Days, E = 305.626708 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.18	1.11	1.07	1.17	5.28	3.02	0.29	6.11	6.01	0.04	-0.06	4.24	7.48	0.30	1.99





### Stellar Parameters For KIC 004141670

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$7181^{+199}_{-324}$	$4.162^{+0.153}_{-0.187}$	$-0.260^{+0.250}_{-0.350}$	$1.617^{+0.482}_{-0.351}$	$1.388^{+0.205}_{-0.228}$	$0.463^{+0.359}_{-0.234}$
	+3%/-5%	+4%/-4%	+96%/-135%	+30%/-22%	+15%/-16%	+78%/-51%
Source	KIC0	KIC0	KIC0	DSEP		

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology  
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

### Secondary Eclipse Parameters for KIC 004141670-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-56 \pm 10$	$2.81^{+2.37}_{-1.87}$	$509^{+39}_{-35}$	$4945^{+3499}_{-984}$	$5702^{+40201}_{-4016}$
Alt.	$-68 \pm 61$	$3.98^{+2.19}_{-2.33}$	$509^{+36}_{-38}$	$4399^{+2077}_{-1385}$	$3067^{+15059}_{-2780}$

$T_{max}$  = Theoretical Maximum Planetary Temperature

$T_{obs}$  = Observed Planetary Temperature (Assuming  $A=0.3$ )

$A_{obs}$  = Observed Albedo (Assuming  $T=0$ )

If a secondary eclipse is present, the system is likely an EB if  $T_{obs} \gg T_{max}$  AND  $A_{obs} \gg 1.0$

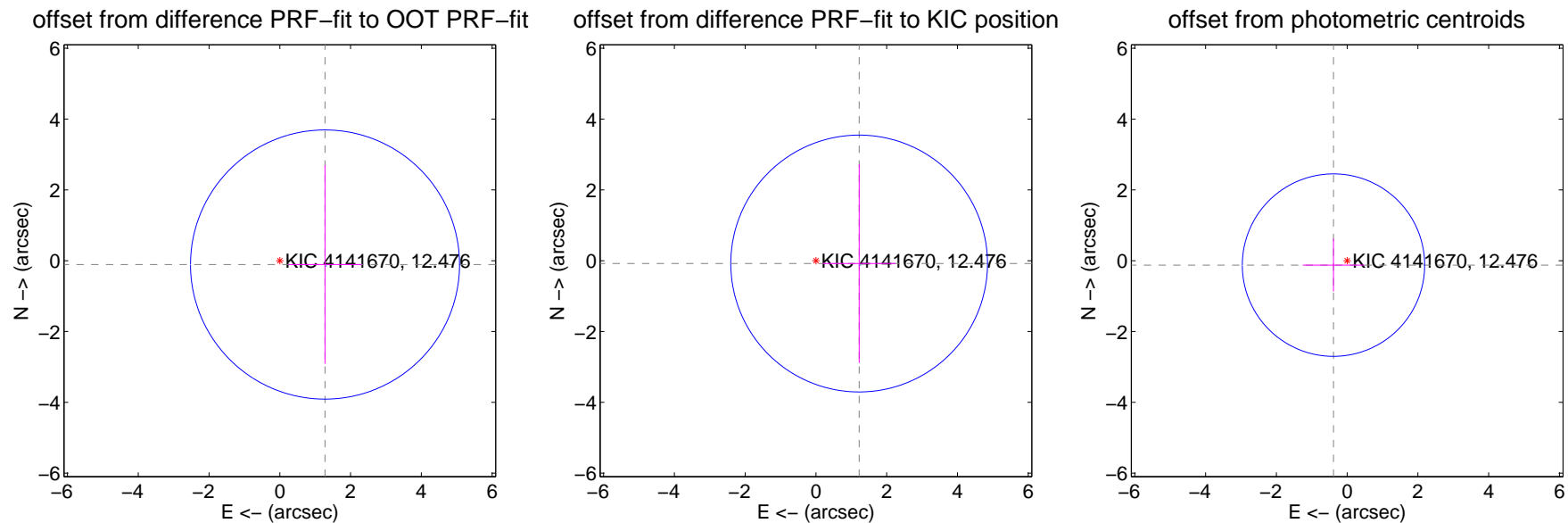
## DV Centroid Data

Supplemental centroid analysis for 004141670-02. Kepler magnitude: 12.48. Transit SNR 7.06

There are 1 quarters with good PRF difference image offsets

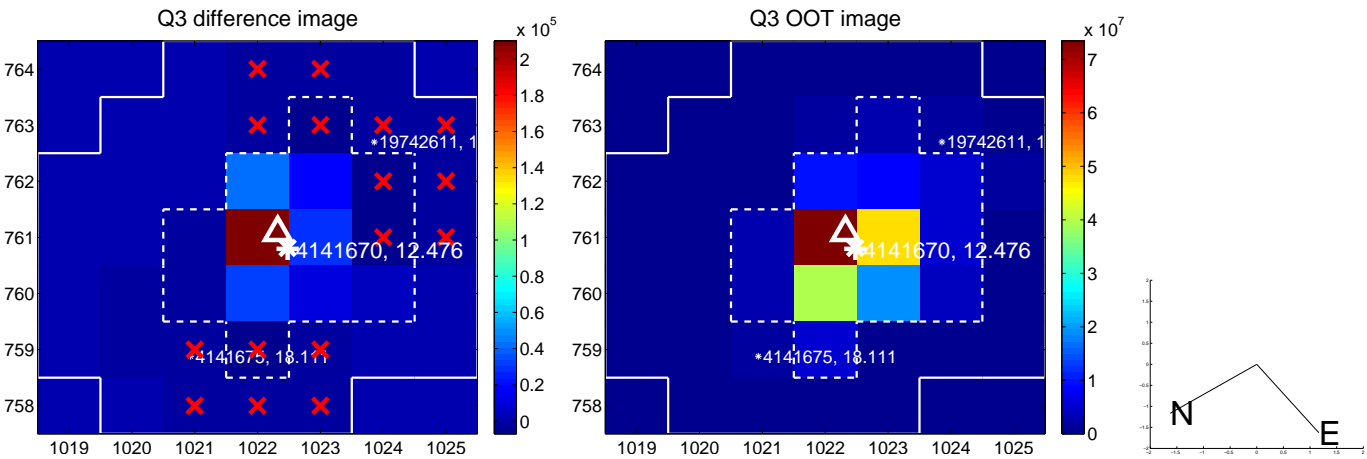
The direct PRF centroid is offset from the target star catalog position by about 0.05 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.283 \pm 1.267$	1.01	$-1.278 \pm 1.035$	$-0.108 \pm 2.804$
PRF-fit source offset from KIC position	$1.224 \pm 1.209$	1.01	$-1.222 \pm 1.028$	$-0.080 \pm 2.809$
photometric centroid source offset	$0.41 \pm 0.86$	0.47	$0.39 \pm 0.87$	$-0.12 \pm 0.75$



Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . Red \*: target star. Blue \*: Other stars. Text next to a star gives its KIC ID and kepmag. KIC IDs > 15,000,000 are from the UKIRT catalog.

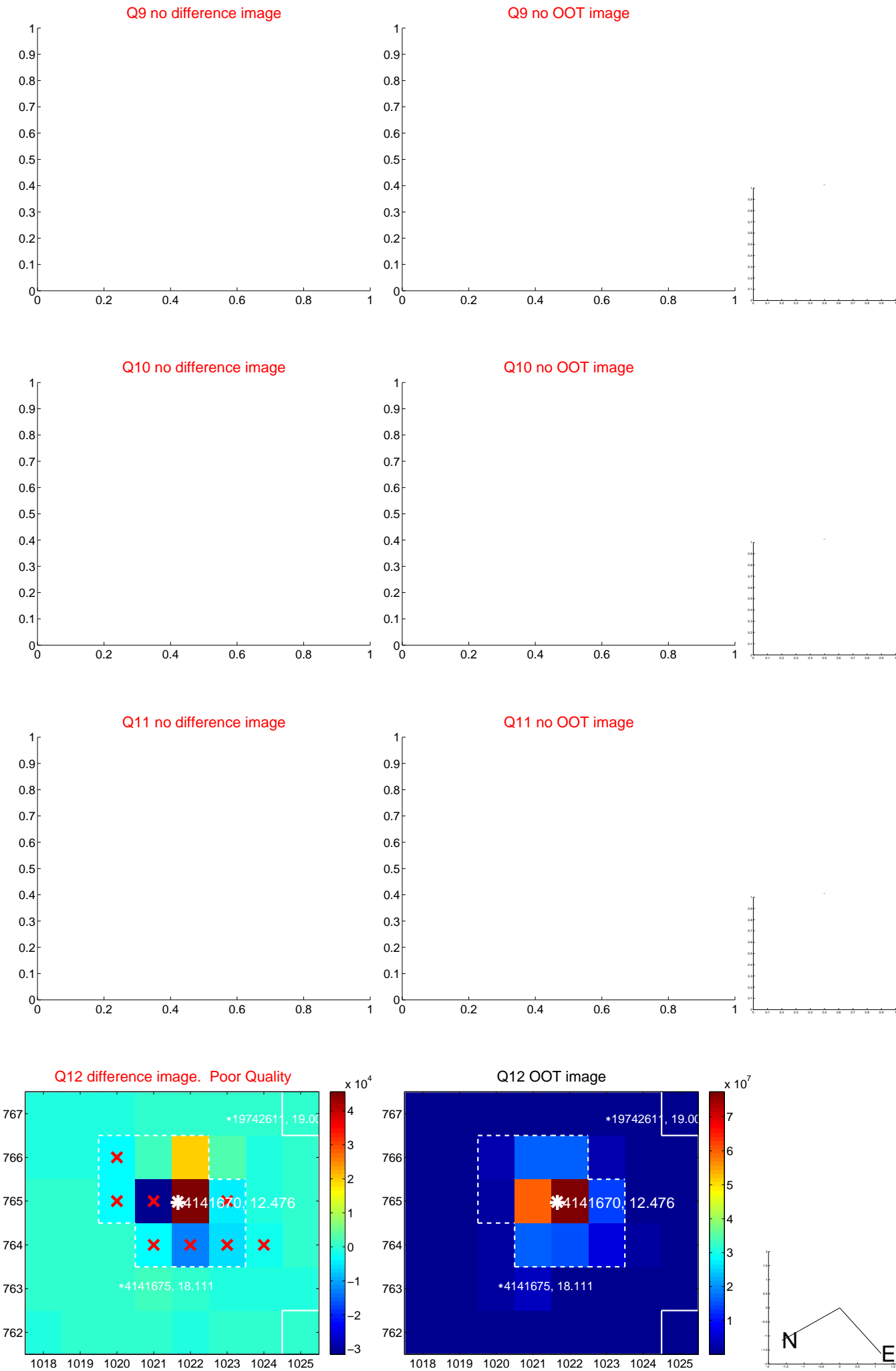
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

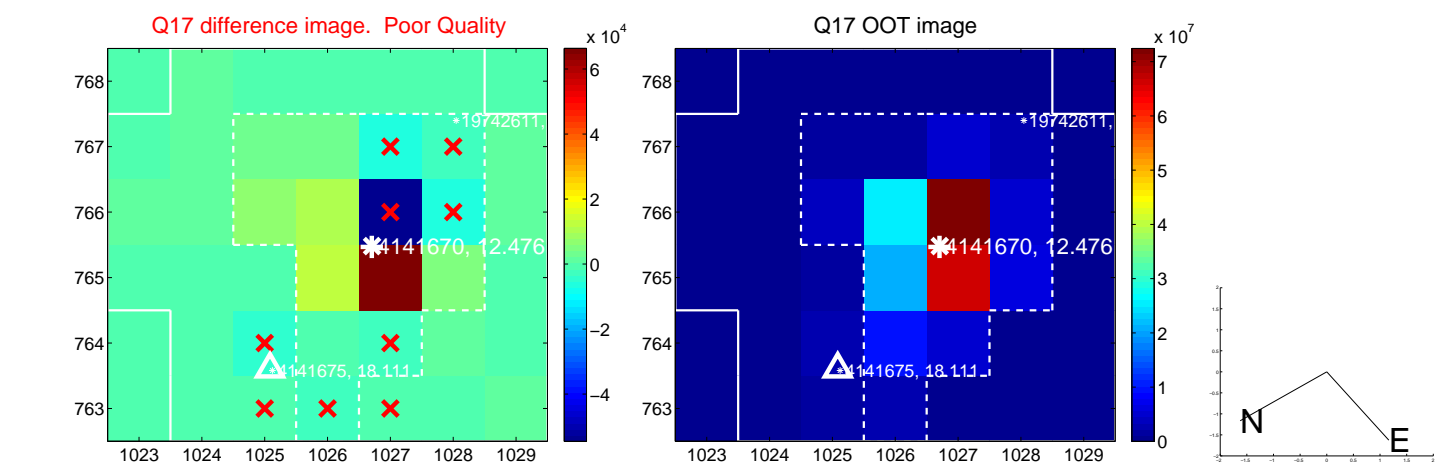


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

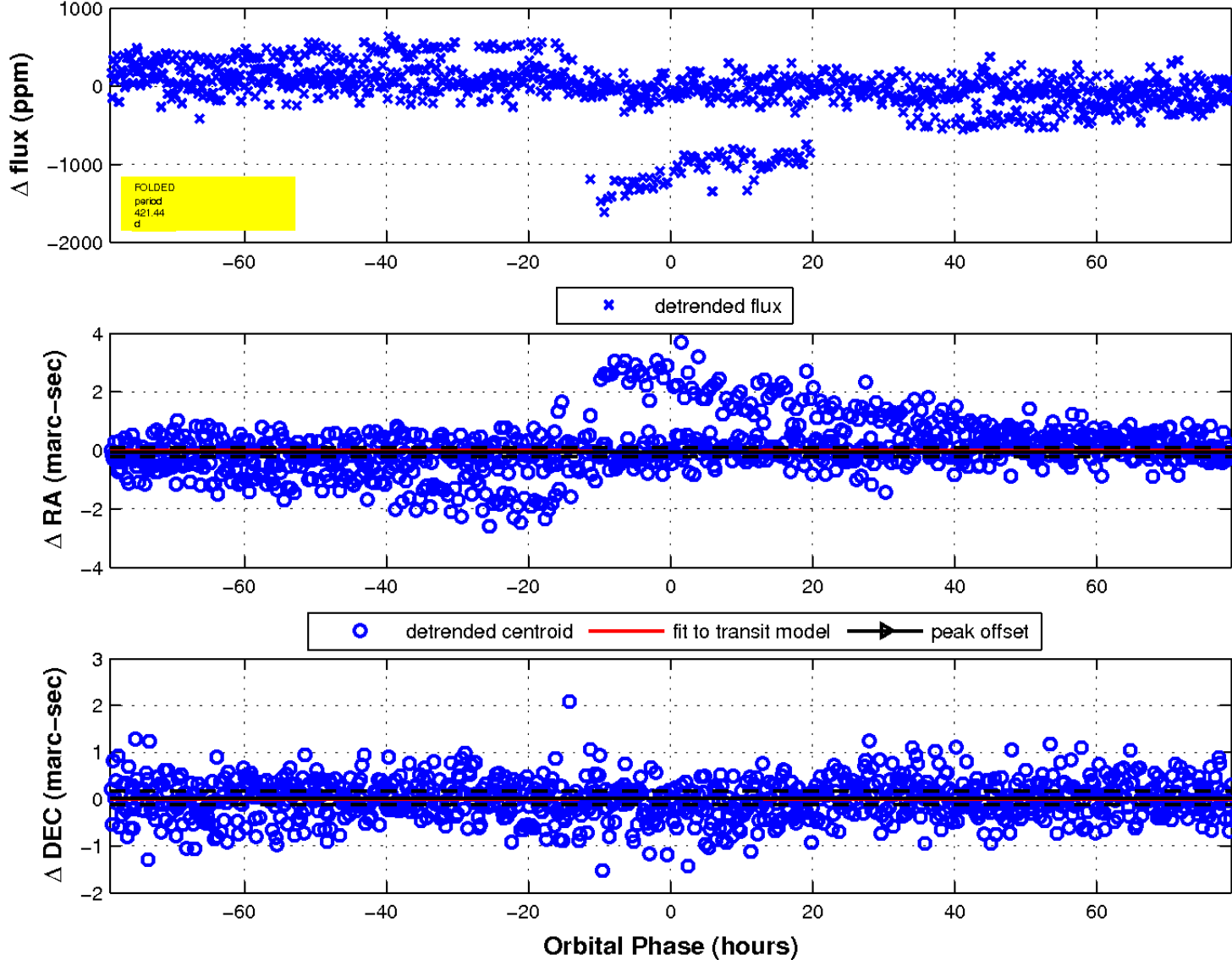




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

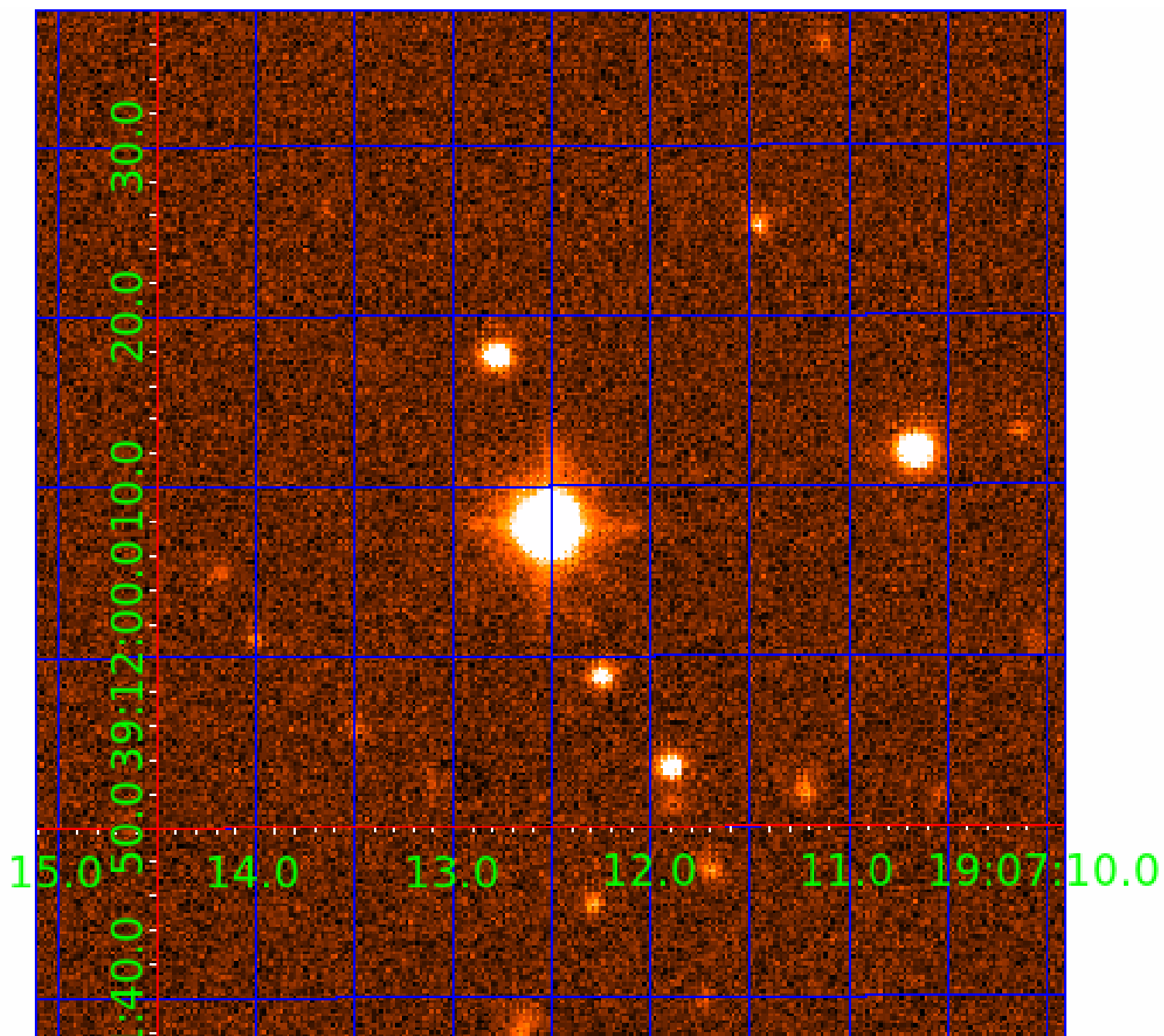


fluxWeightedCentroids, Planet 2 of 3



UKIRT Image

Declination



# KIC 004141670

## Q1-17 DR25 TCE Parameters

TCE	Run Type	KOI?	Period (Days)	Epoch (BKJD)	Depth (ppm)	Duration (Hours)	MES	SNR	$R_{\star}$ ( $R_{\odot}$ )	$T_{\star}$ (K)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004141670-01	OBS	No	2.354437	132.171153	18.3	2.780	9.3	7.4	1.62	7181	0.80	4177.58
004141670-02	OBS	No	421.437706	305.689514	182.9	26.349	27.4	7.1	1.62	7181	2.21	4.14
004141670-03	OBS	No	2.354663	133.264643	20.2	3.699	10.6	9.3	1.62	7181	0.84	4177.05

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004141670-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004141670-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004141670-03	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD

**Notes:** OBS = Observed. INJ = Injected. INV = Inverted. SCR = Scrambled.

N = Not Transit-Like. S = Stellar Eclipse. C = Centroid Offset. E = Ephemeris Match.

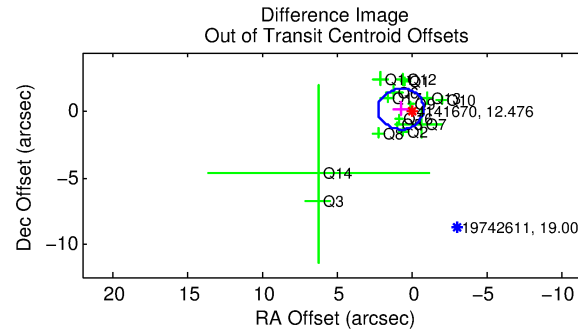
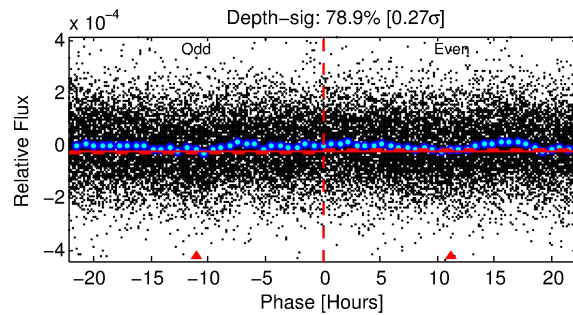
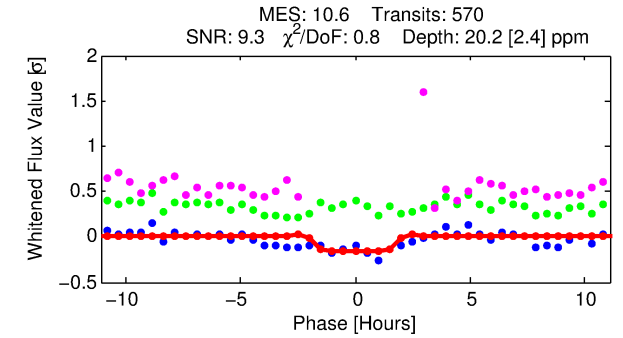
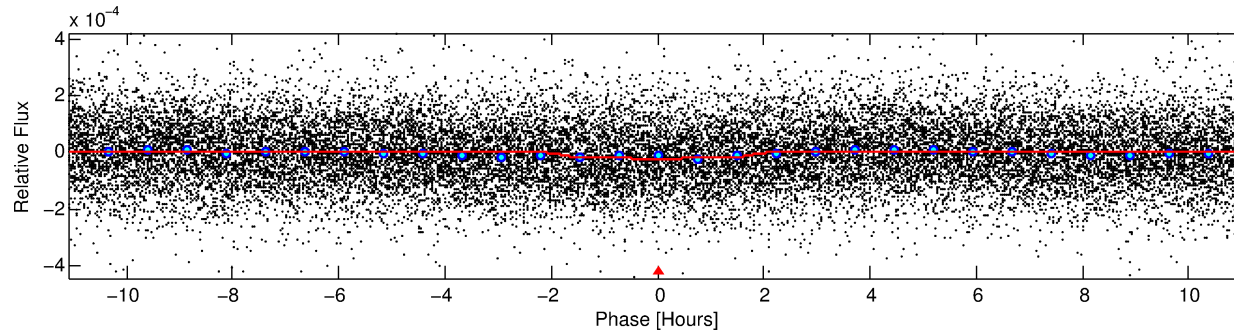
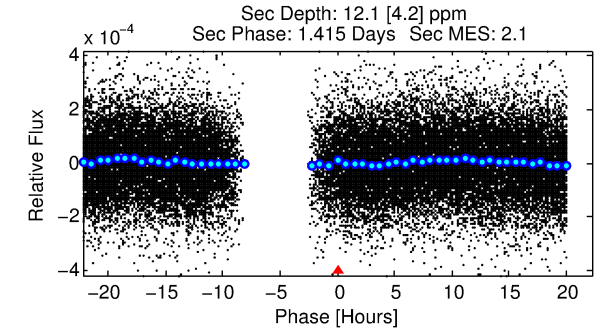
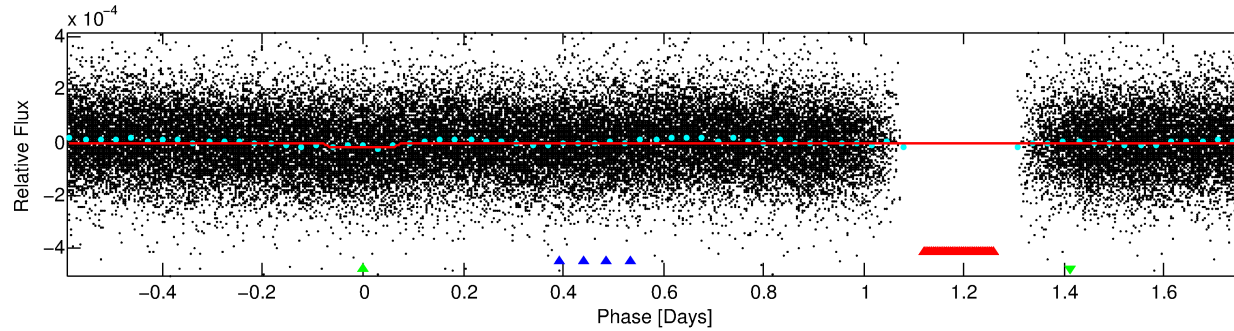
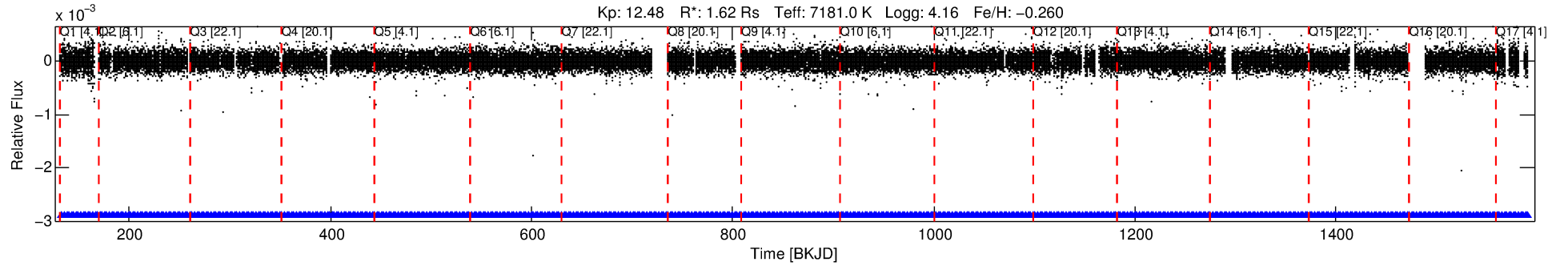
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 004141670-03

No Significant Match Found

# DV One-Page Summary

KIC: 4141670 Candidate: 3 of 3 Period: 2.355 d



## DV Fit Results:

Period = 2.35466 [0.00002] d  
Epoch = 133.2646 [0.0049] BKJD  
Rp/R\* = 0.0048 [0.0014]  
a/R\* = 2.37 [3.65]  
b = 0.90 [0.40]  
Seff = 4177.04 [1641.65]  
Teq = 2050 [201] K  
Rp = 0.84 [0.36] Re  
a = 0.0386 [0.0095] AU  
Ag = 13.99 [10.83] [1.20σ]  
Teffp = 6130 [1094] K [3.67σ]

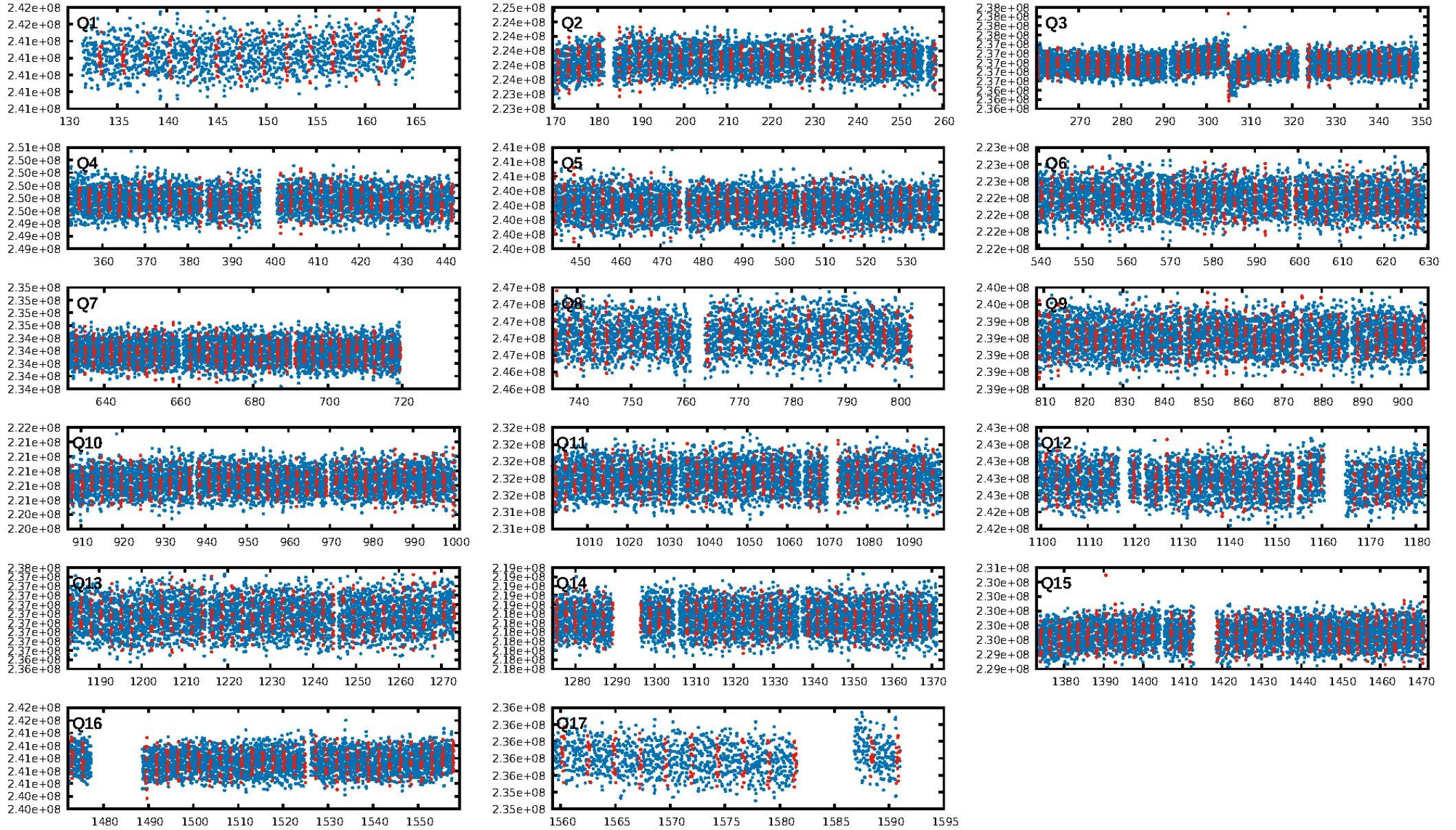
## DV Diagnostic Results:

**ShortPeriod-sig: 0.1% [0.00σ]**  
LongPeriod-sig: 100.0% [378.02σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 7.29e-26  
RollingBand-fgt: 1.00 [545/545]  
GhostDiagnostic-chr: 2.309  
Centroid-sig: 30.2%  
Centroid-so: 0.994 arcsec [0.87σ]  
OotOffset-rm: 0.736 arcsec [1.44σ]  
KicOffset-rm: 0.765 arcsec [1.50σ]  
OotOffset-st: 4/3/3/5 [15]  
KicOffset-st: 4/3/3/5 [15]  
DiffImageQuality-fgm: 0.67 [10/15]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 13:16:50 Z

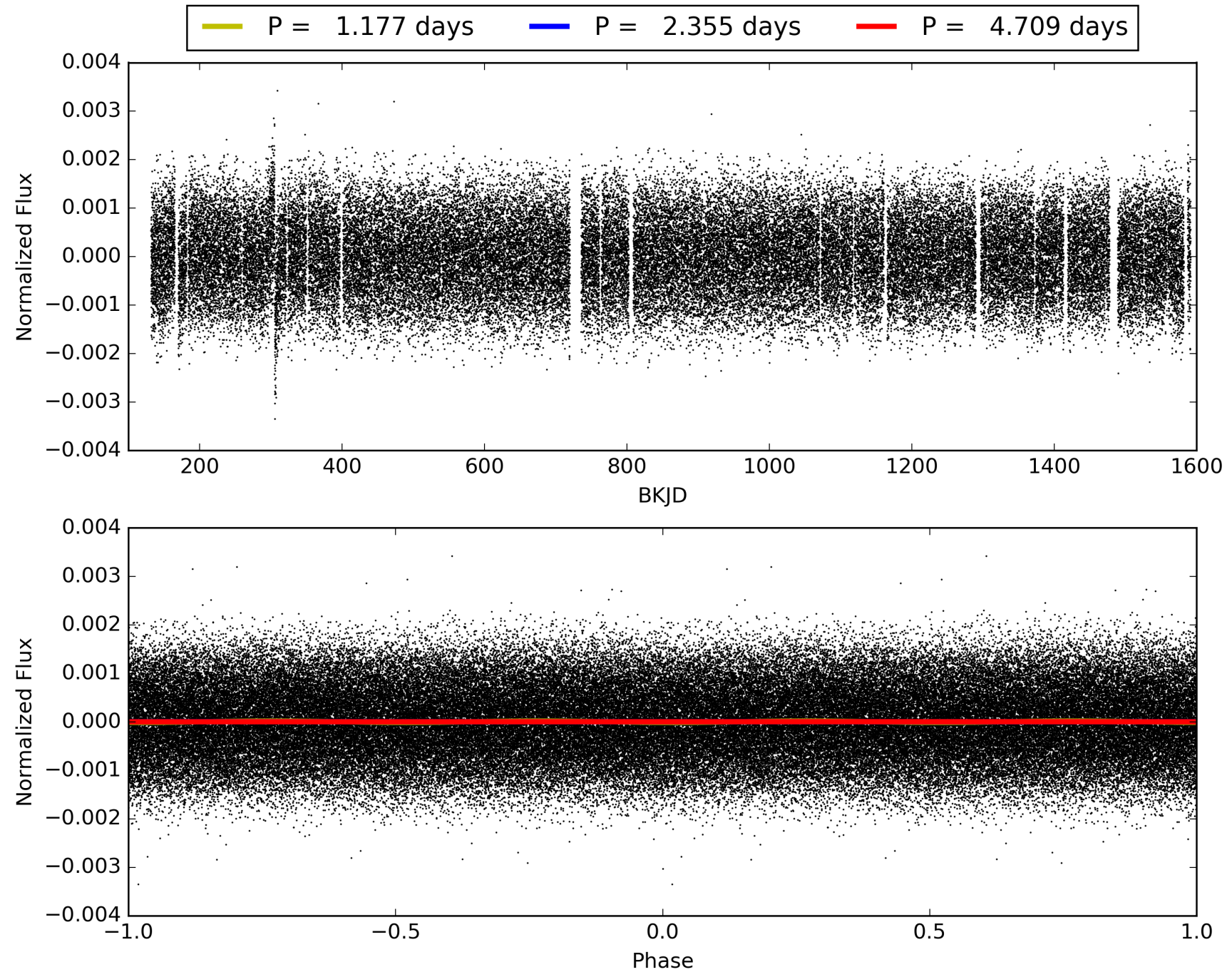
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 004141670-03, PDC Light Curves





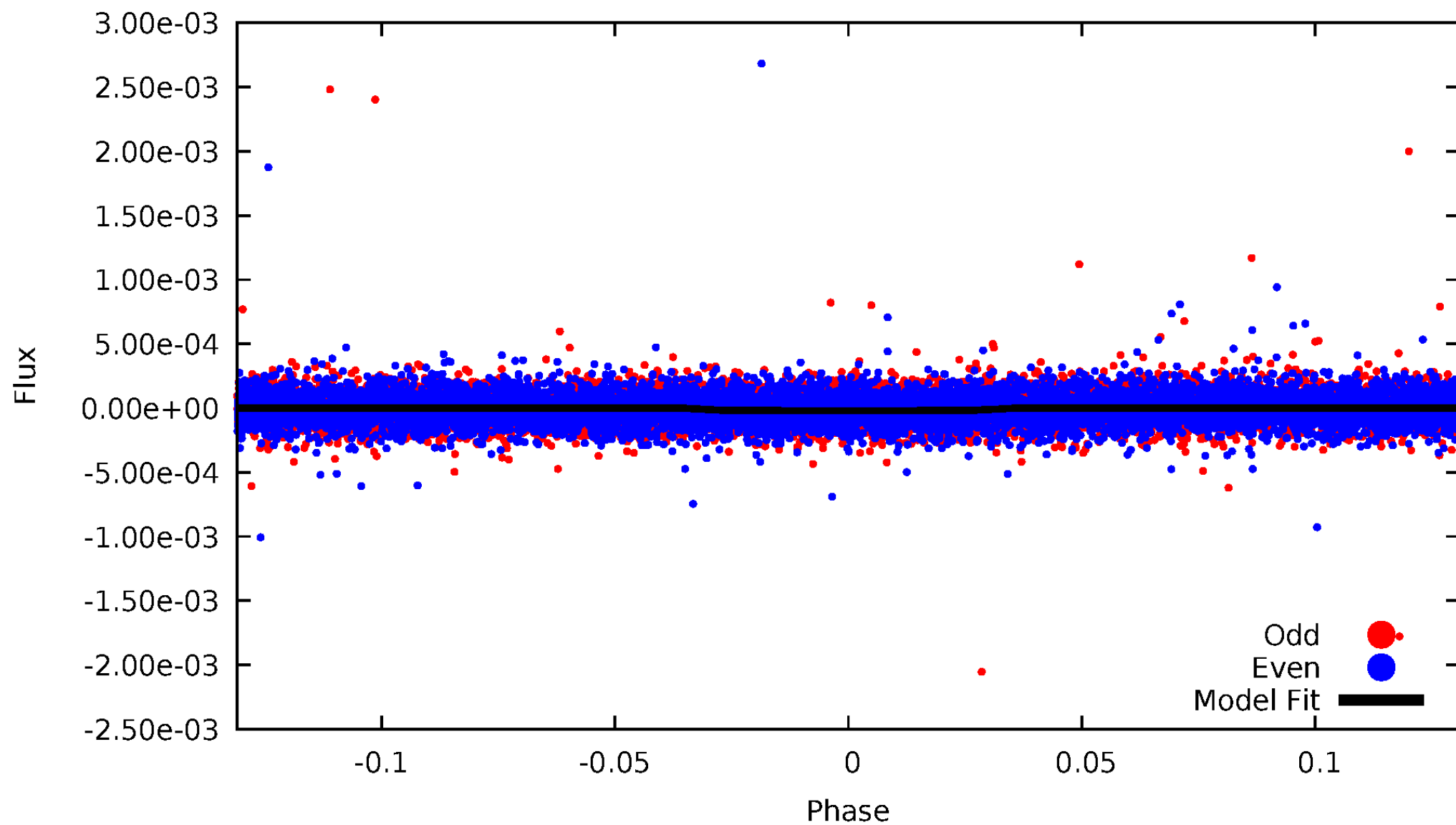
# TCE 004141670-03





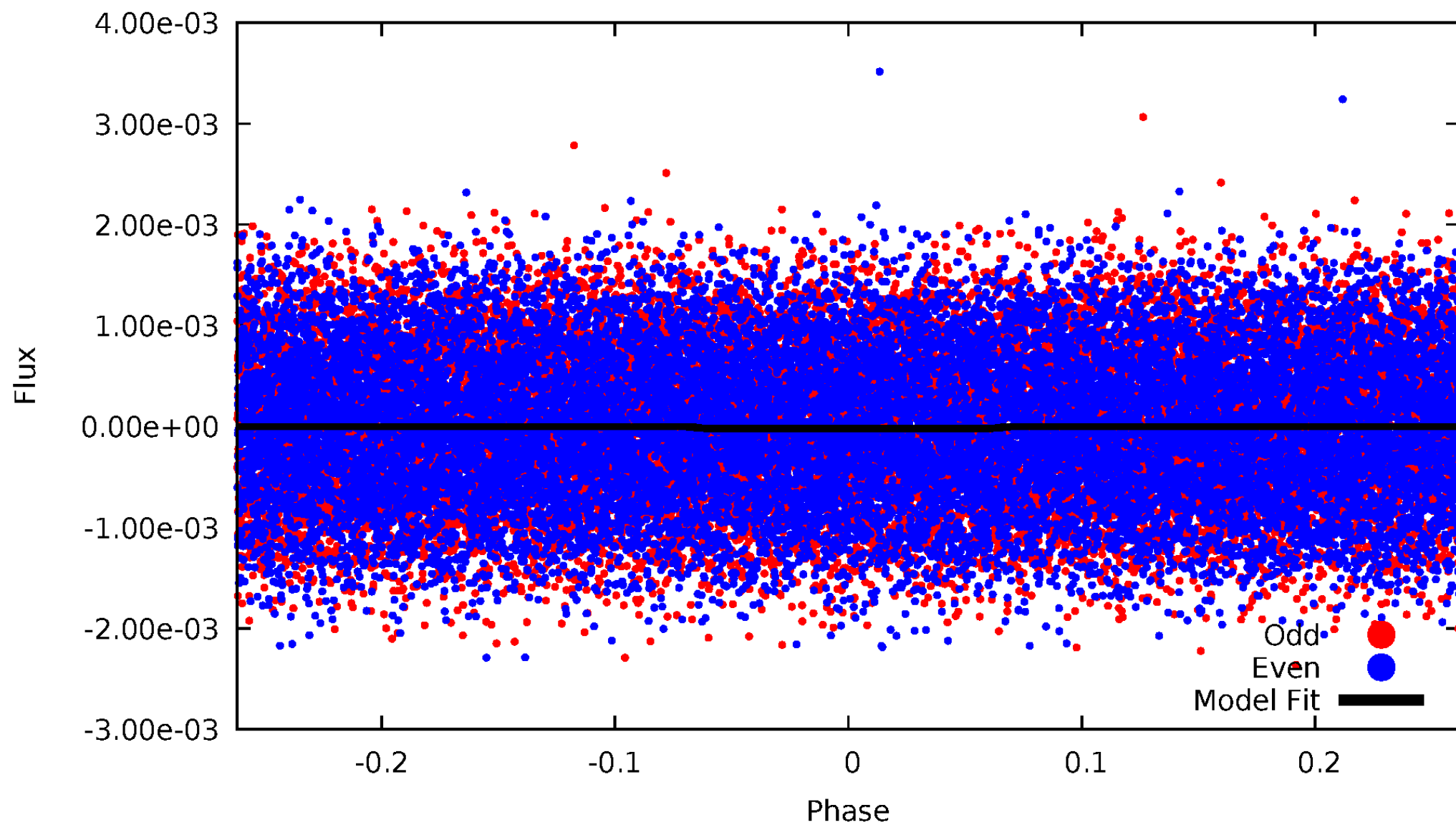
# DV Odd/Even

TCE 004141670-03



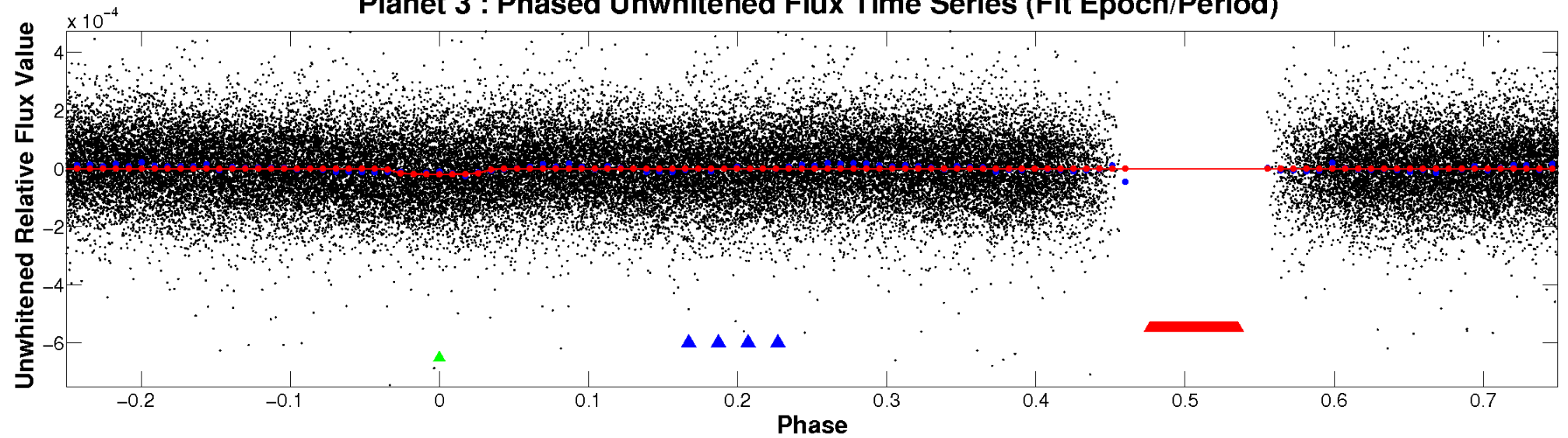
# ALT Odd/Even

TCE 004141670-03

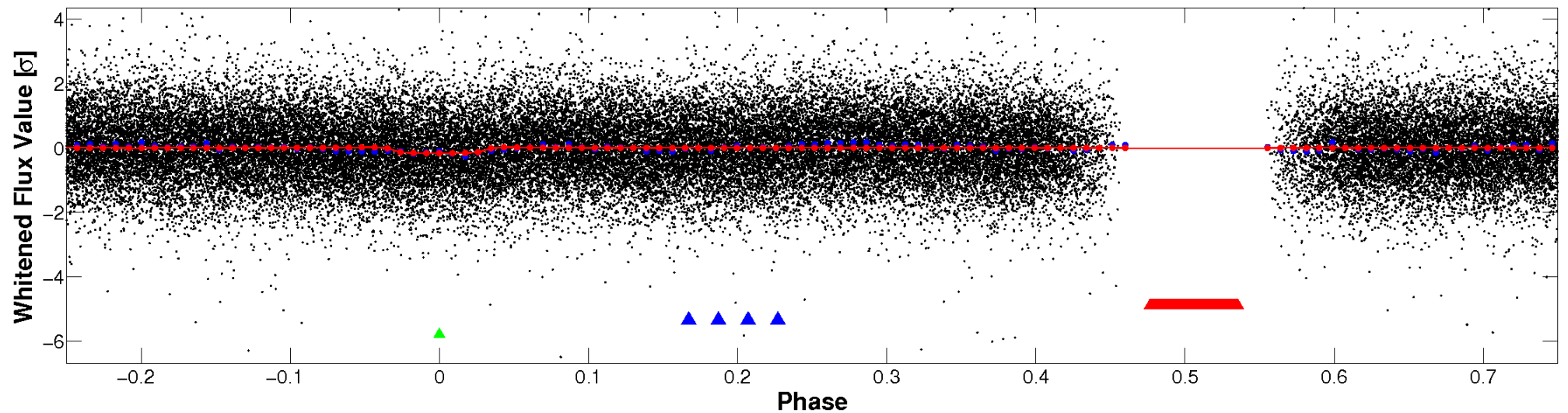


# Non-Whitened Vs. Whitened Light Curve

**Planet 3 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)**

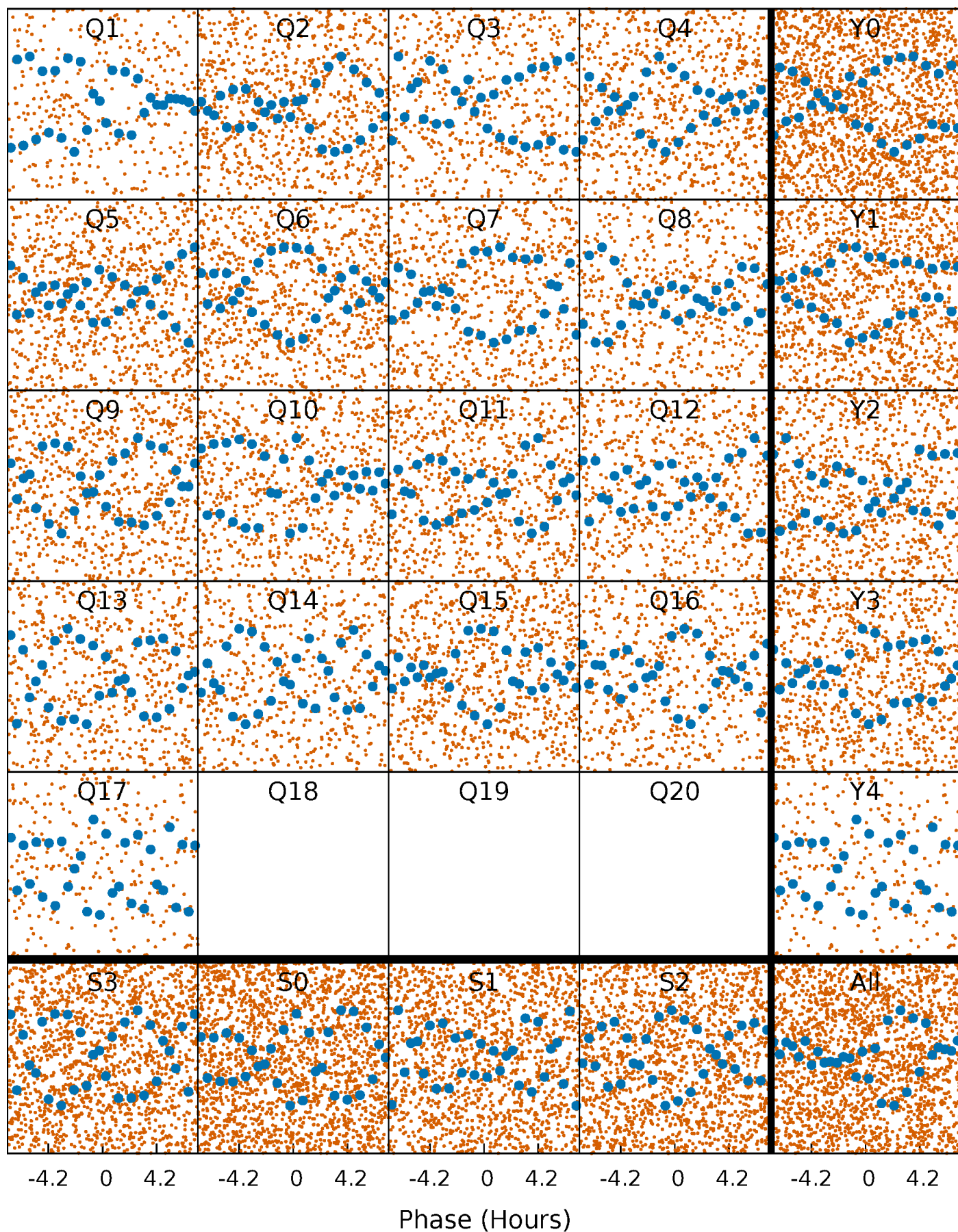


**Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

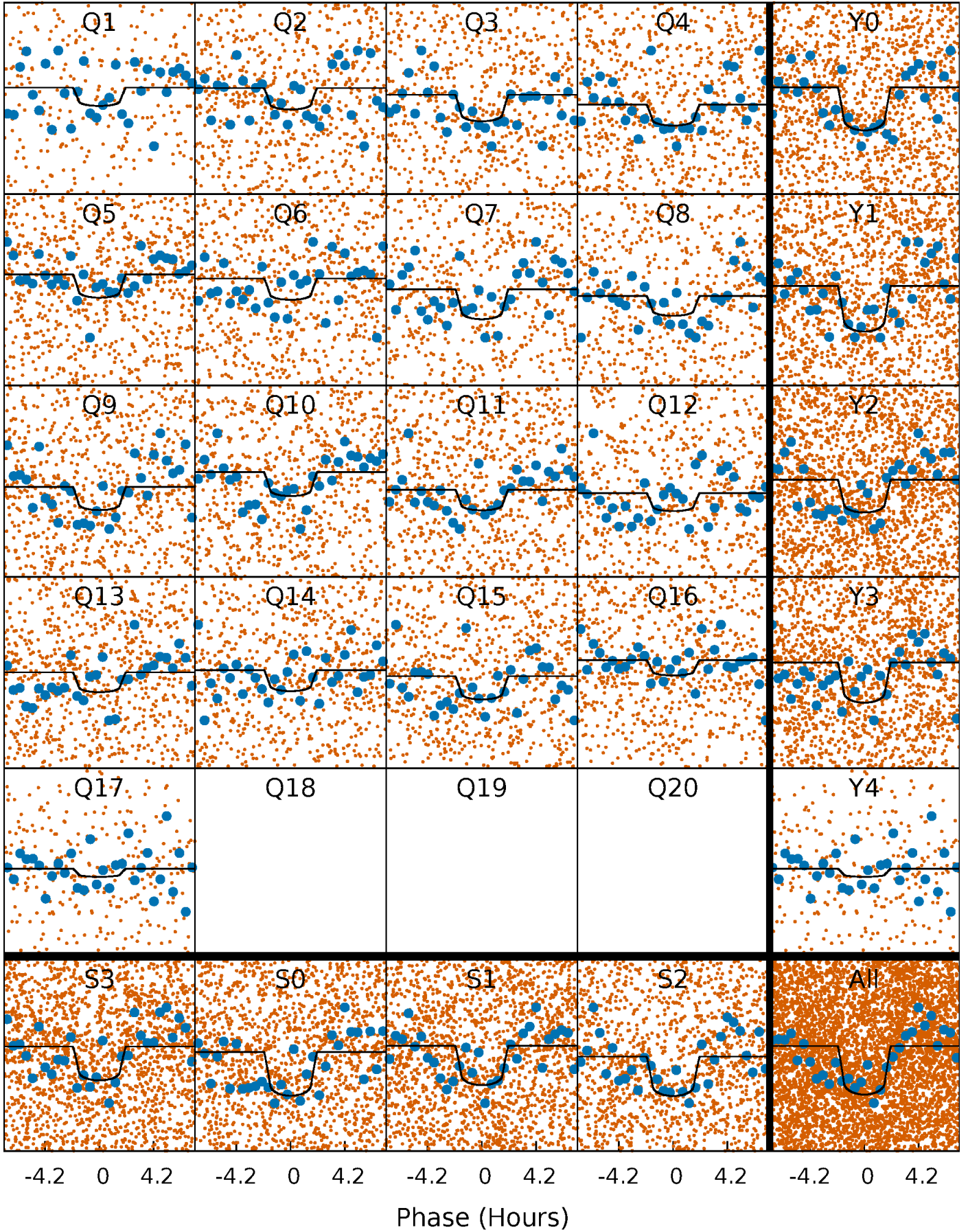
TCE 004141670-03 P= 2.354663 Days  $T_0=133.264643$  (BKJD)





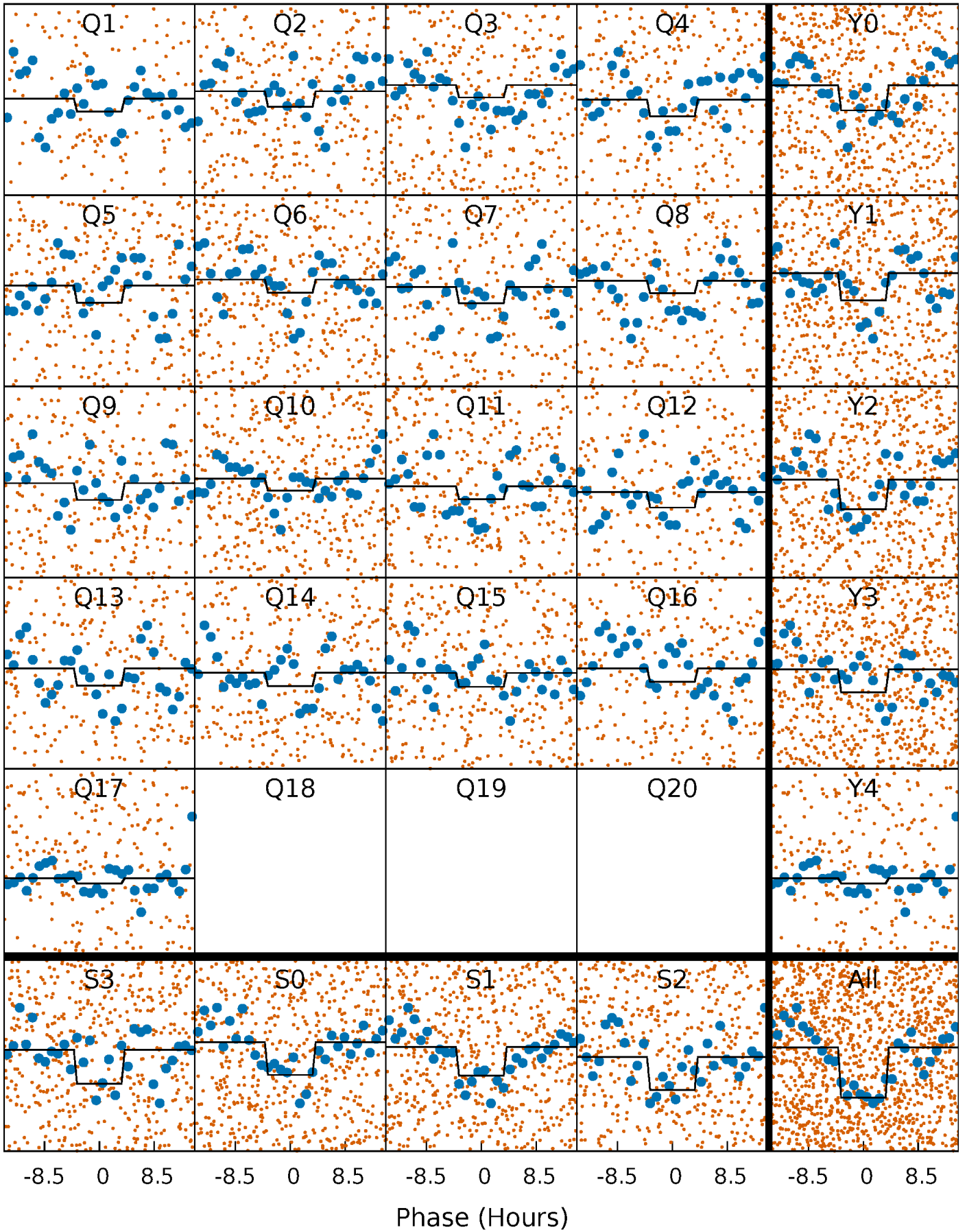
# DV Quarter-Phased Transit Curves

TCE 004141670-03   P= 2.354663 Days    $T_0=133.264643$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

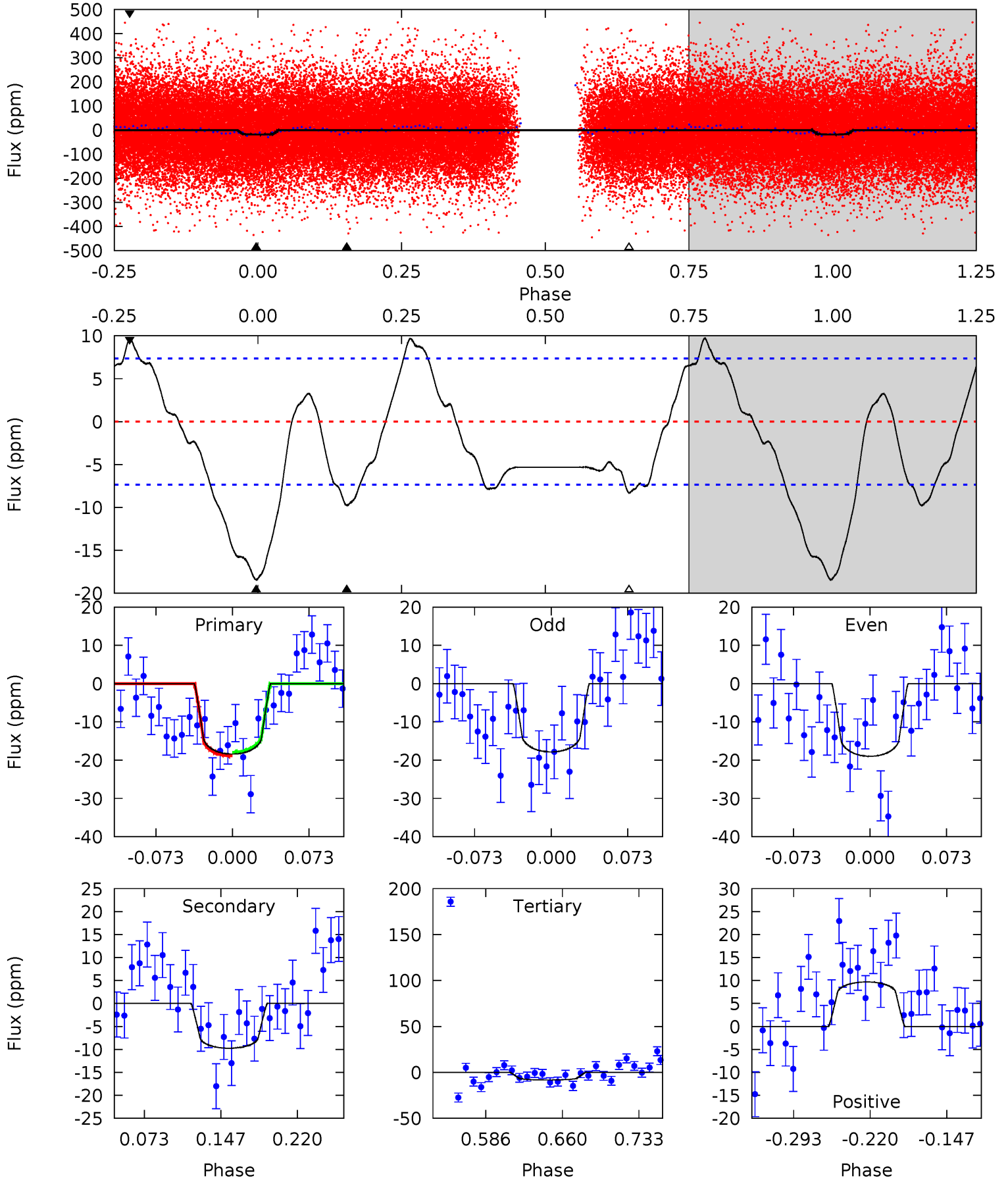
TCE 004141670-03   P= 2.354523 Days    $T_0=133.263684$  (BKJD)



# DV Model-Shift Uniqueness Test

004141670-03, P = 2.354663 Days, E = 130.909980 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
11.6	6.14	5.24	6.10	4.63	1.79	3.58	6.37	5.50	0.91	0.04	0.36	1.01	0.35	0.30

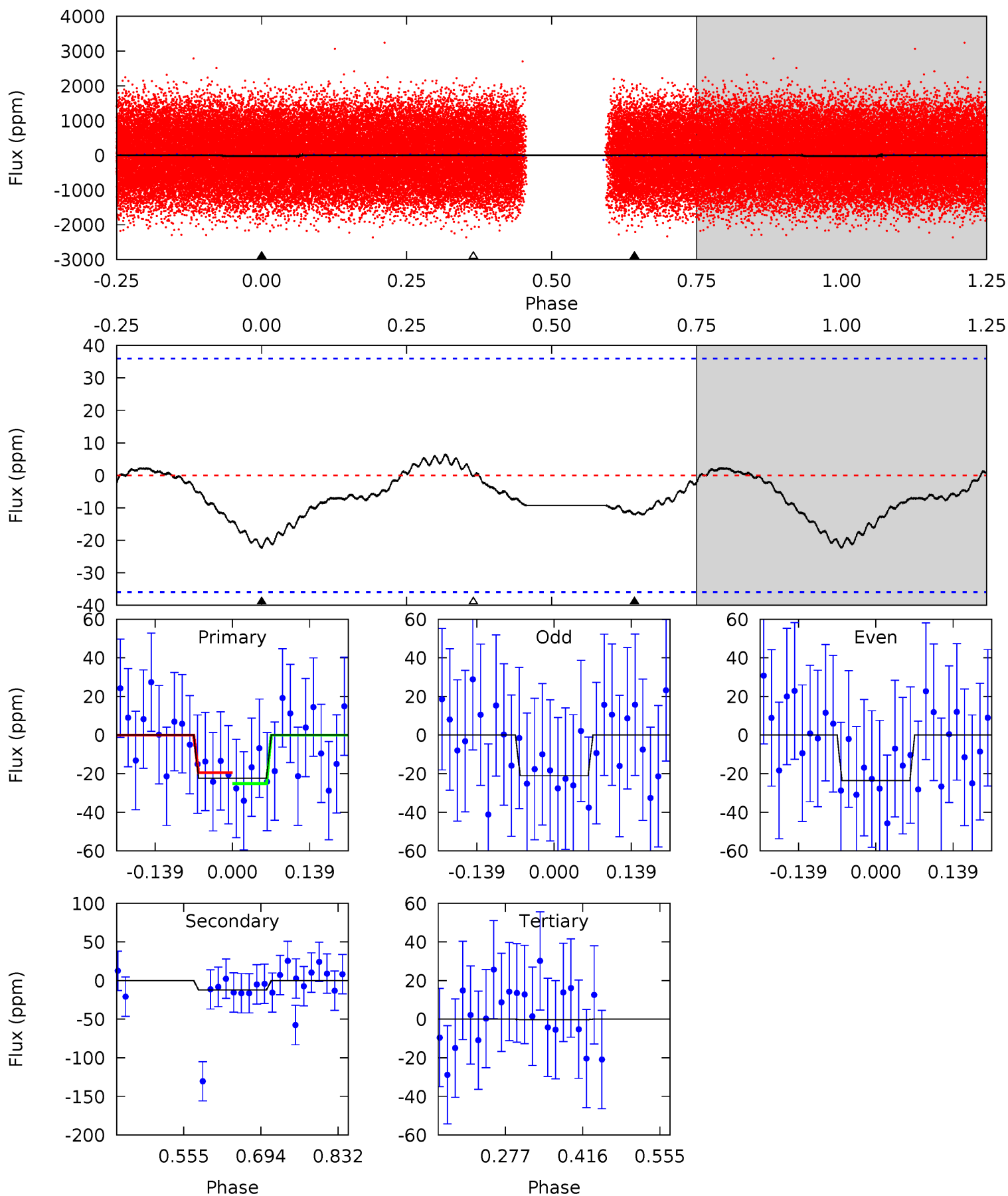




# Alt Model-Shift Uniqueness Test

004141670-03, P = 2.354523 Days, E = 130.909161 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
2.79	1.51	0.03	0	4.50	1.48	0.53	2.76	2.79	1.48	1.51	0.16	1.21	0.23	0.35



### Stellar Parameters For KIC 004141670

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$7181^{+199}_{-324}$	$4.162^{+0.153}_{-0.187}$	$-0.260^{+0.250}_{-0.350}$	$1.617^{+0.482}_{-0.351}$	$1.388^{+0.205}_{-0.228}$	$0.463^{+0.359}_{-0.234}$
	+3%/-5%	+4%/-4%	+96%/-135%	+30%/-22%	+15%/-16%	+78%/-51%
Source	KIC0	KIC0	KIC0	DSEP		

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology  
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

### Secondary Eclipse Parameters for KIC 004141670-03 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-10 \pm 2$	$0.86^{+0.30}_{-0.27}$	$2861^{+219}_{-187}$	$5671^{+1146}_{-706}$	$11^{+12}_{-5}$
Alt.	$-12 \pm 8$	$0.82^{+0.30}_{-0.27}$	$2865^{+194}_{-185}$	$6056^{+1736}_{-1534}$	$14^{+22}_{-10}$

$T_{max}$  = Theoretical Maximum Planetary Temperature

$T_{obs}$  = Observed Planetary Temperature (Assuming  $A=0.3$ )

$A_{obs}$  = Observed Albedo (Assuming  $T=0$ )

If a secondary eclipse is present, the system is likely an EB if  $T_{obs} \gg T_{max}$  AND  $A_{obs} \gg 1.0$

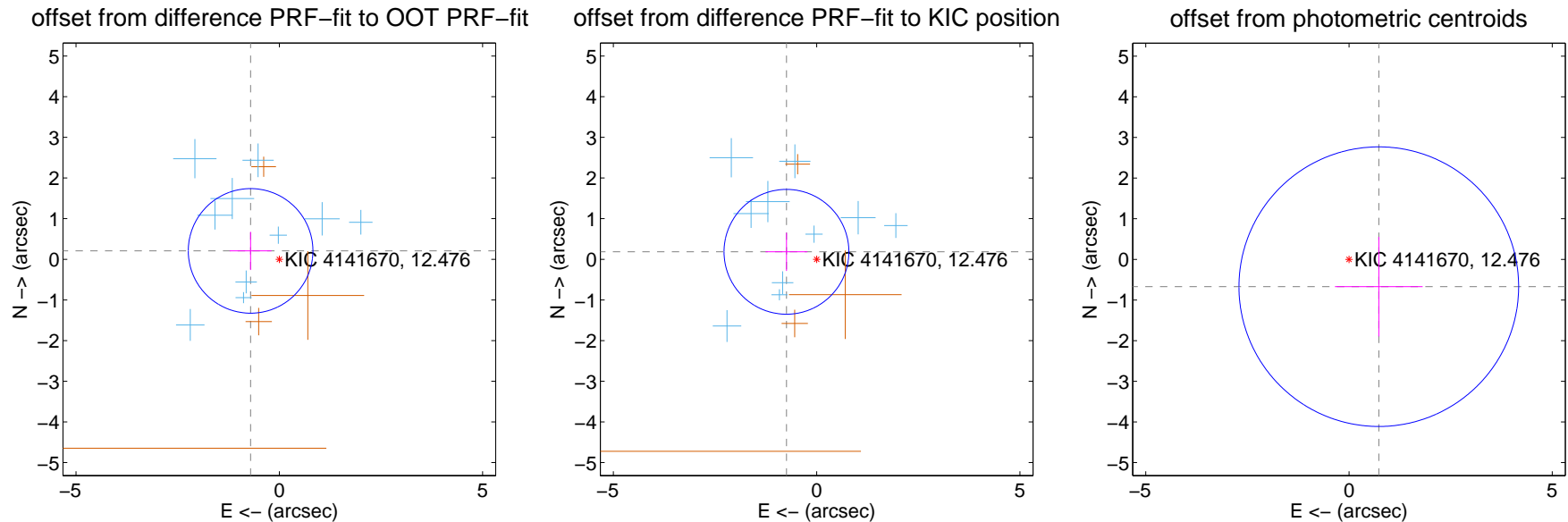
## DV Centroid Data

Supplemental centroid analysis for 004141670-03. Kepler magnitude: 12.48. Transit SNR 9.34

There are 10 quarters with good PRF difference image offsets

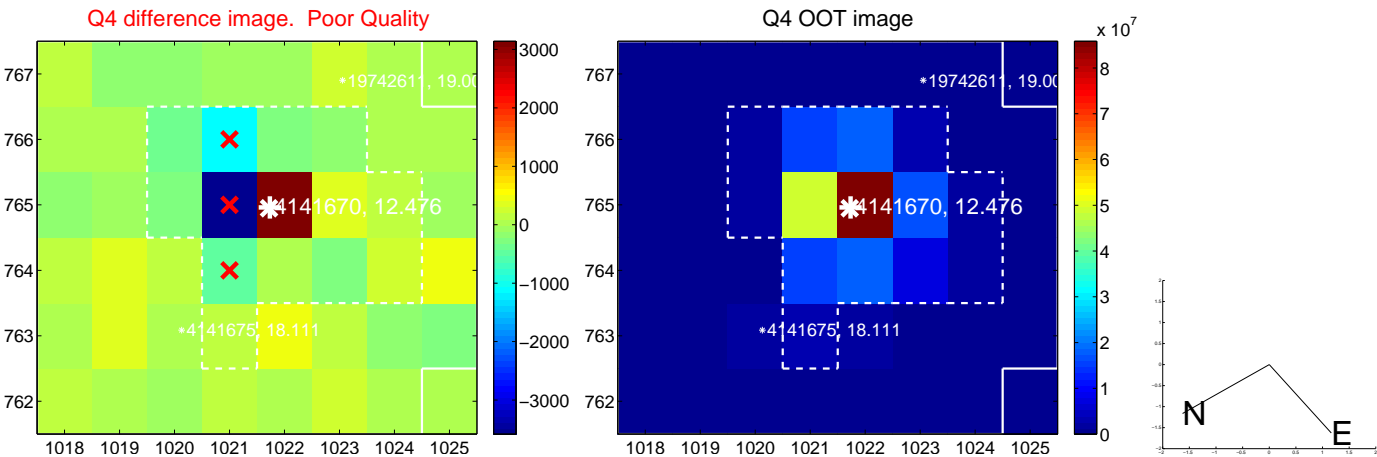
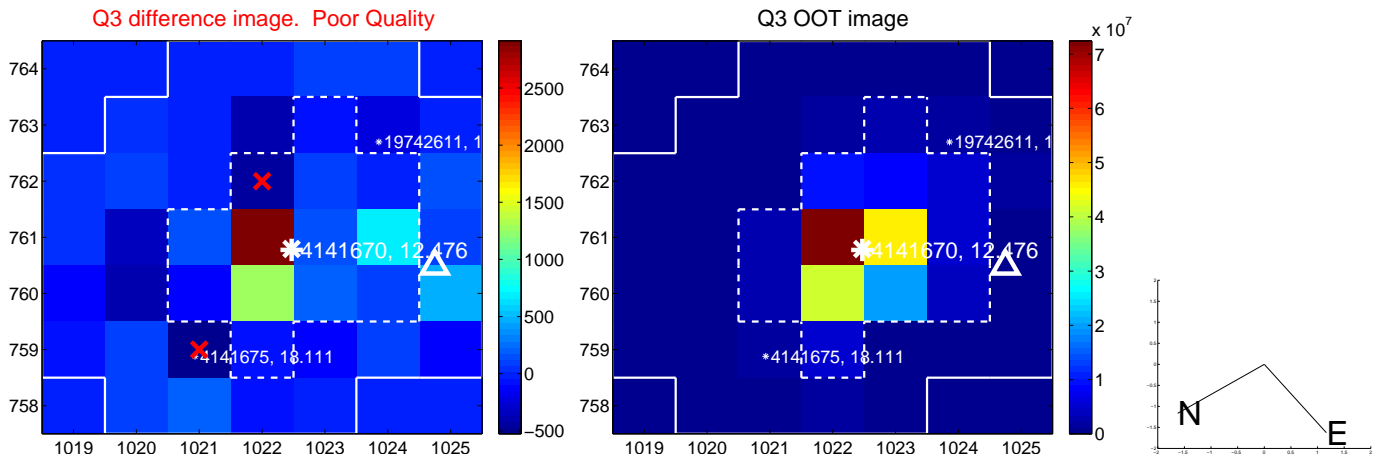
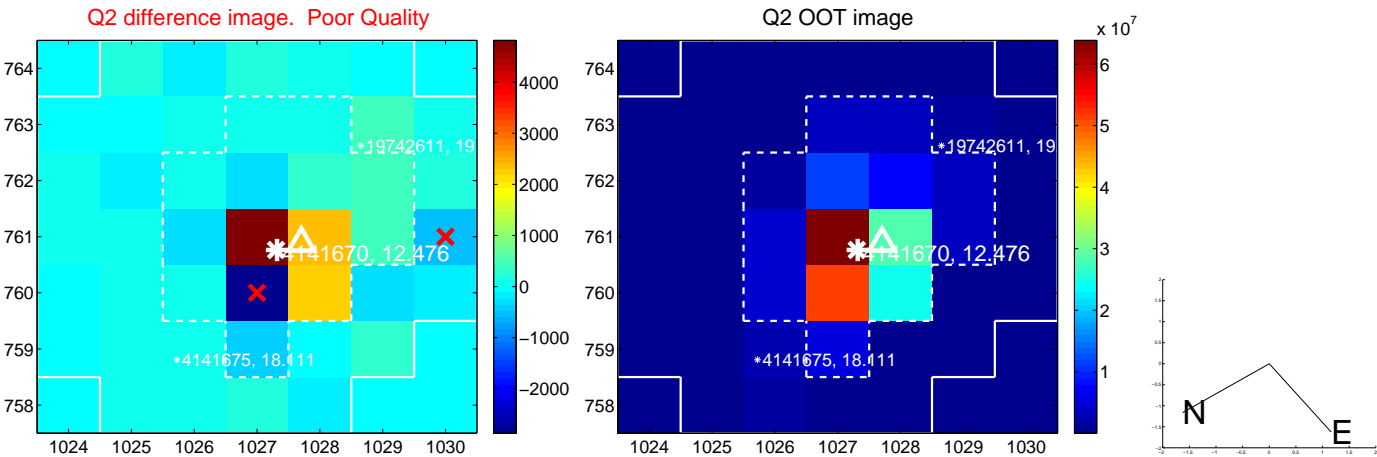
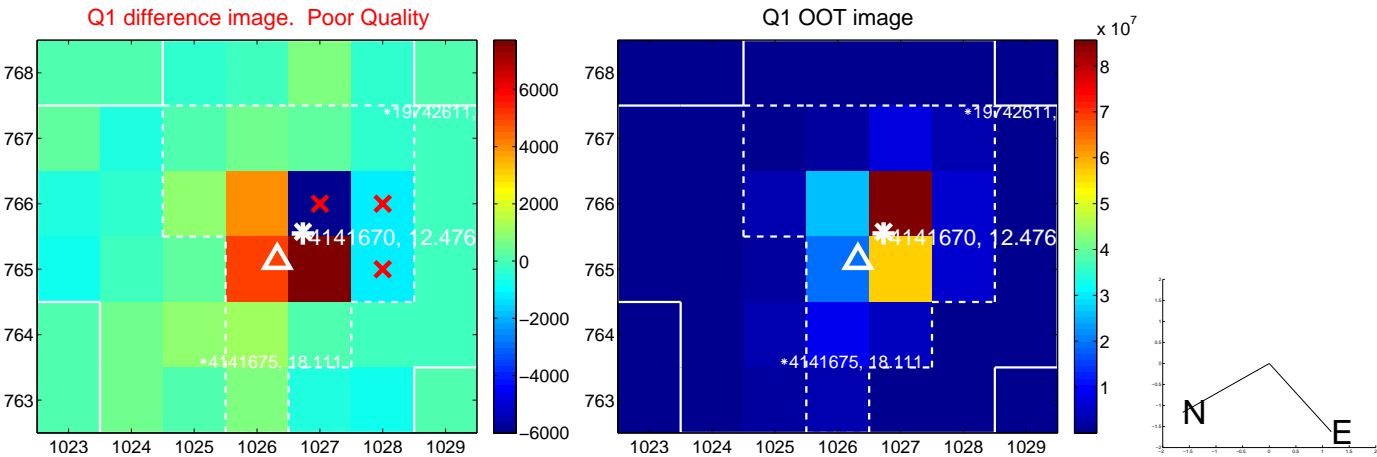
The direct PRF centroid is offset from the target star catalog position by about 0.05 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.736 \pm 0.511$	1.44	$0.706 \pm 0.514$	$0.207 \pm 0.470$
PRF-fit source offset from KIC position	$0.765 \pm 0.512$	1.50	$0.743 \pm 0.514$	$0.184 \pm 0.470$
photometric centroid source offset	$0.99 \pm 1.15$	0.87	$-0.73 \pm 1.08$	$-0.67 \pm 1.22$

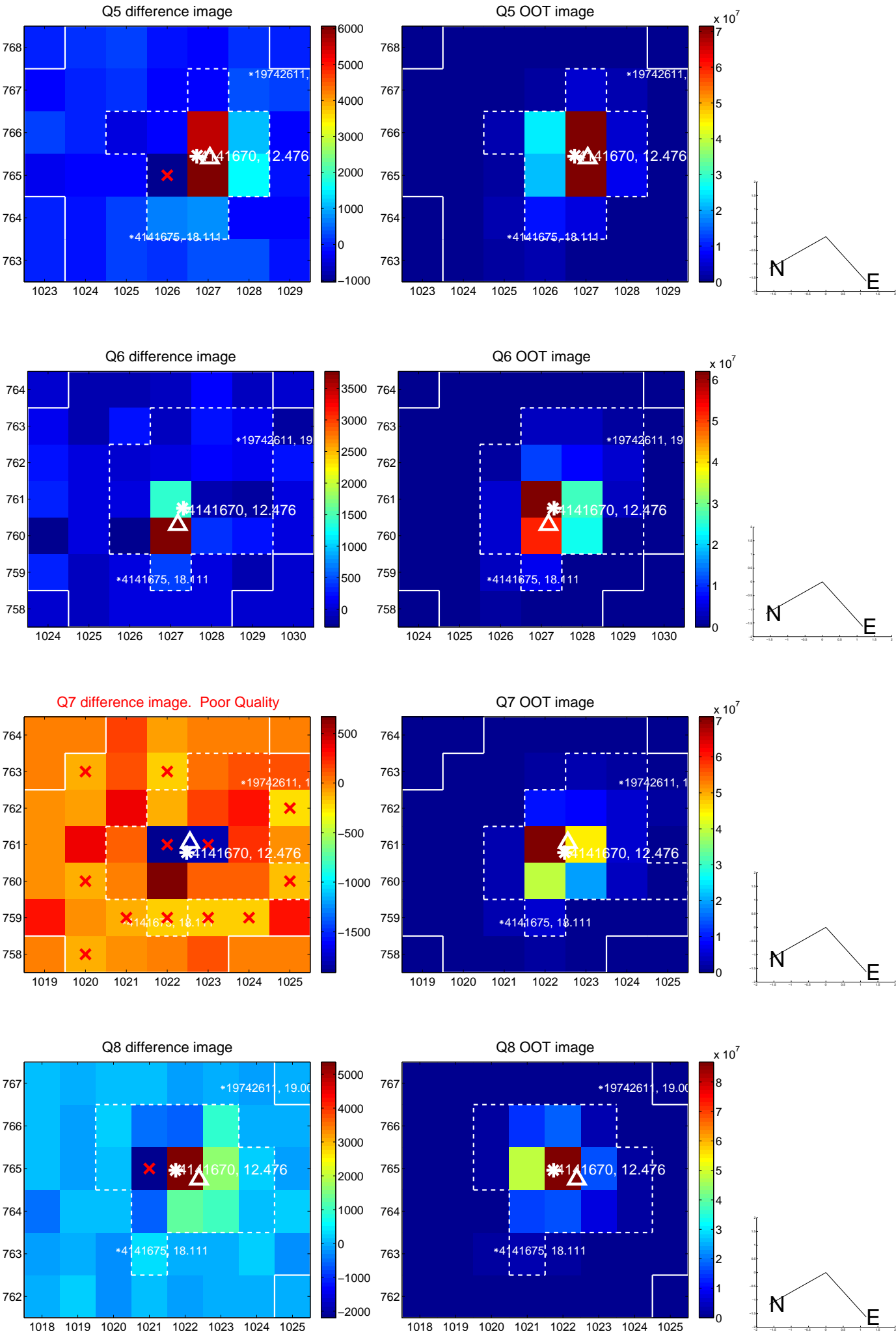


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . Red \*: target star. Blue \*: Other stars. Text next to a star gives its KIC ID and kepmag. KIC IDs > 15,000,000 are from the UKIRT catalog.

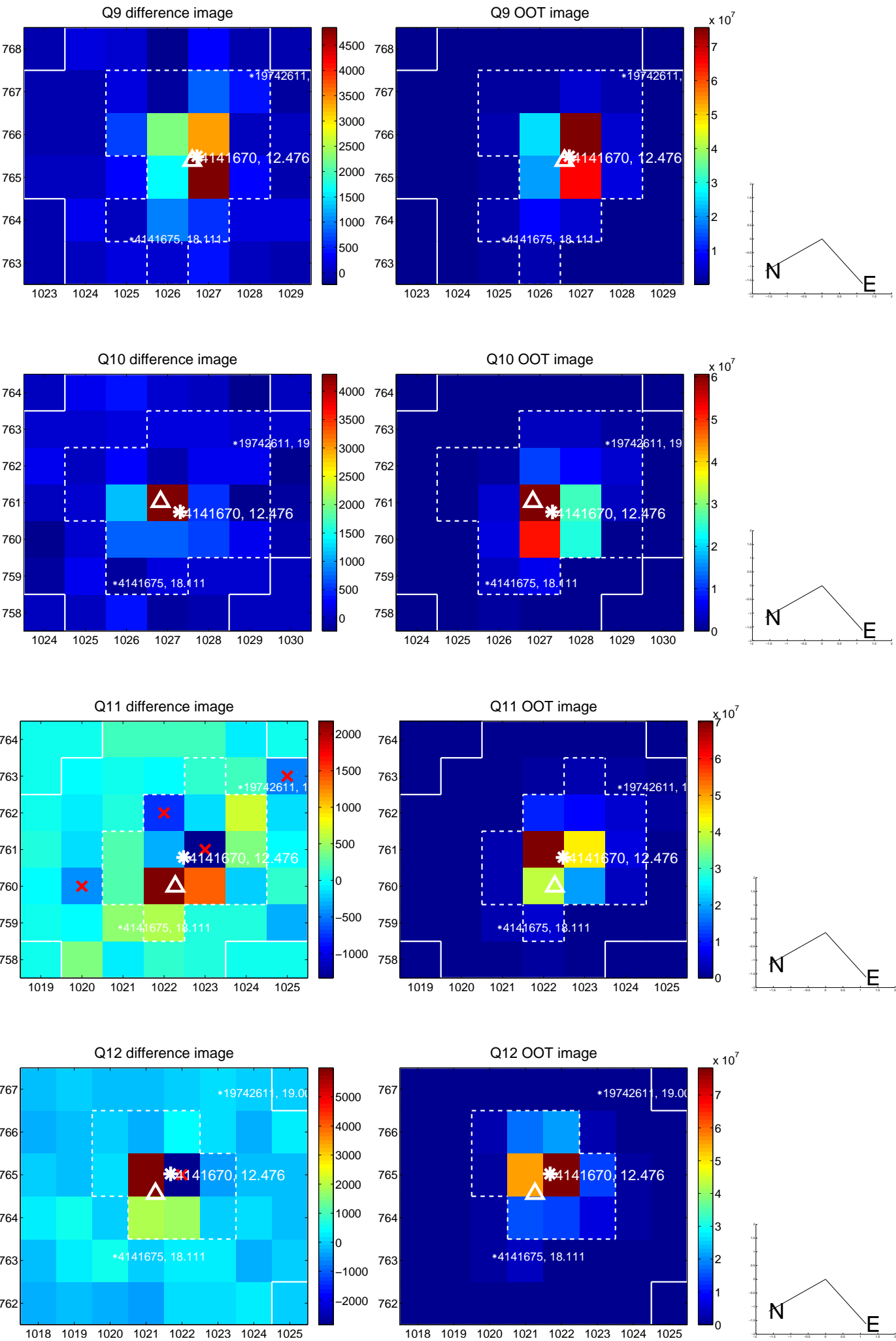
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



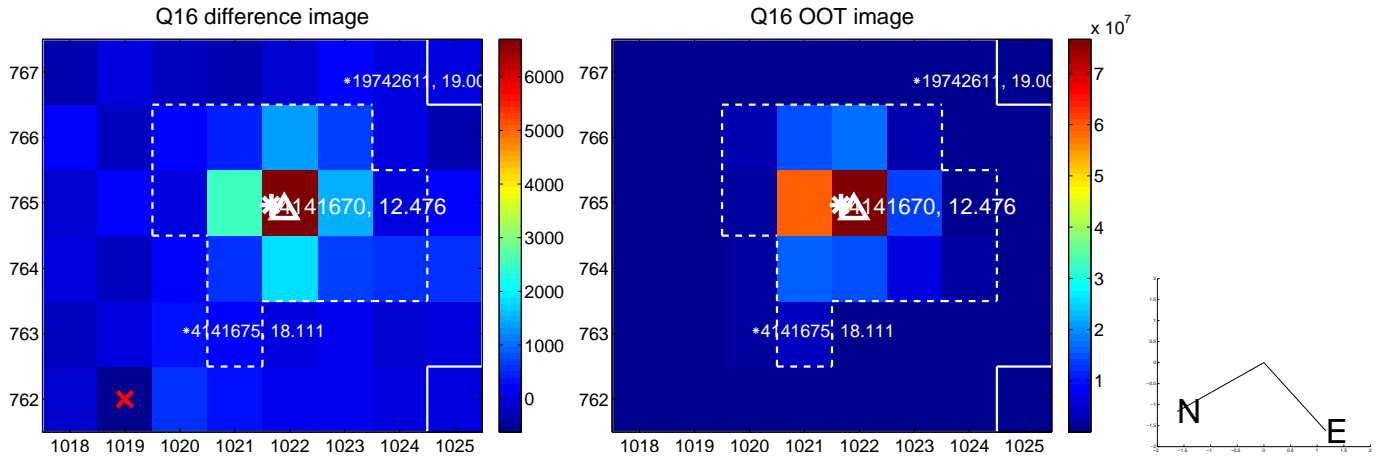
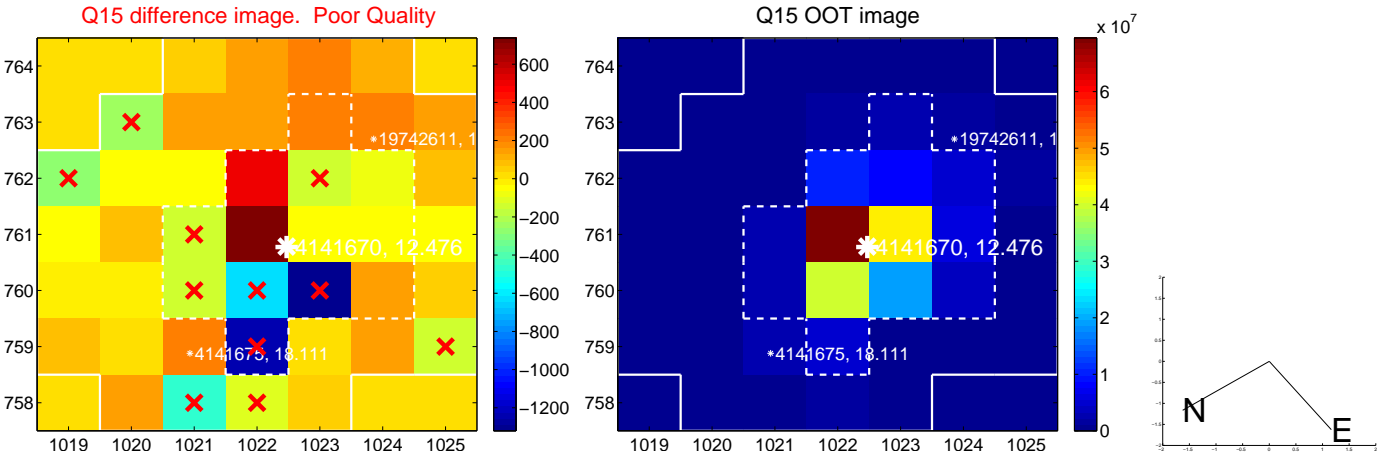
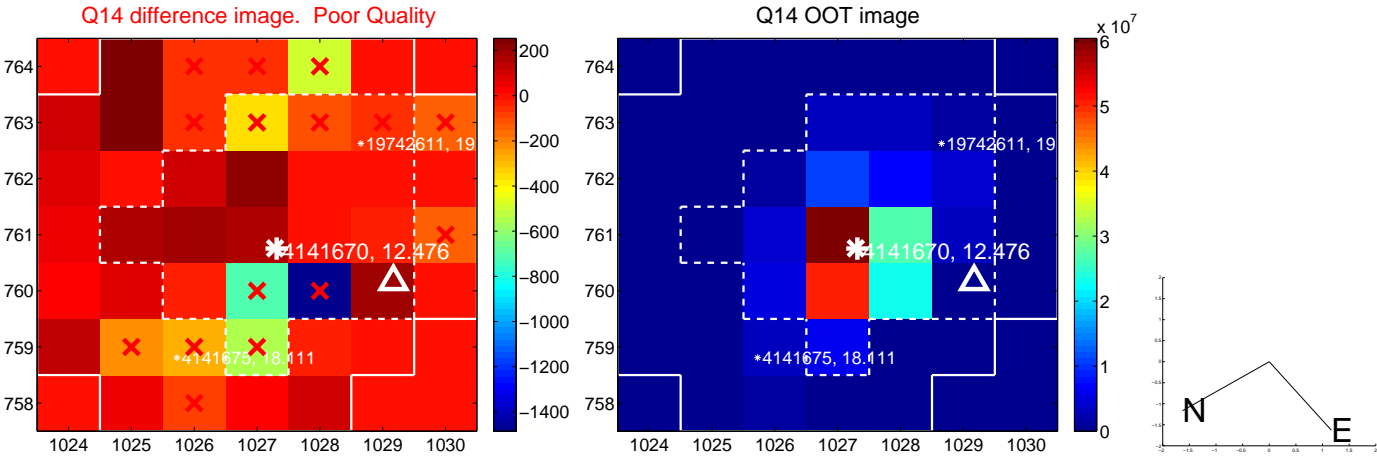
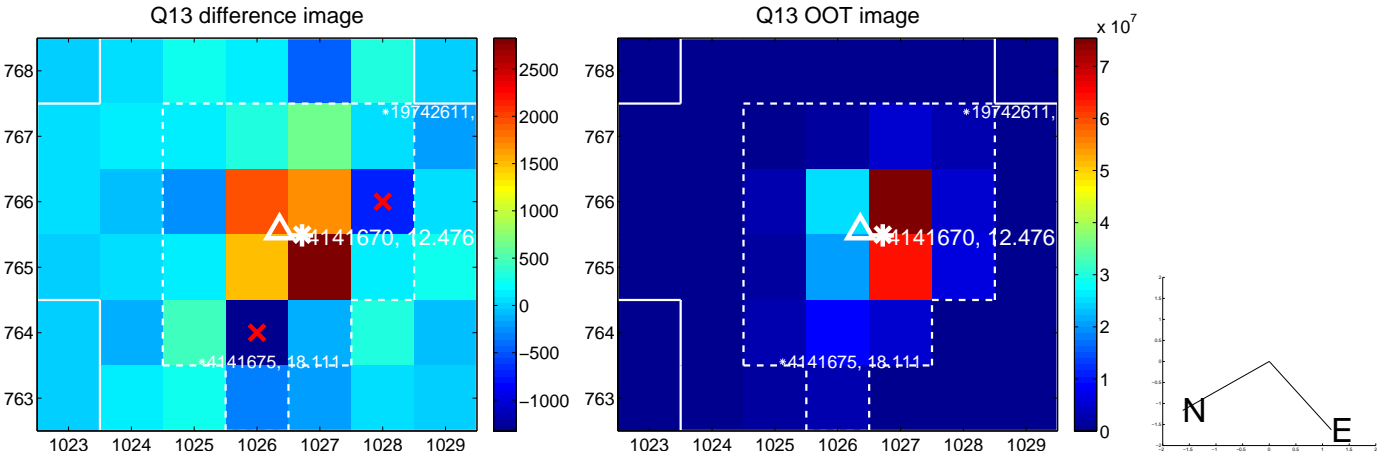
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

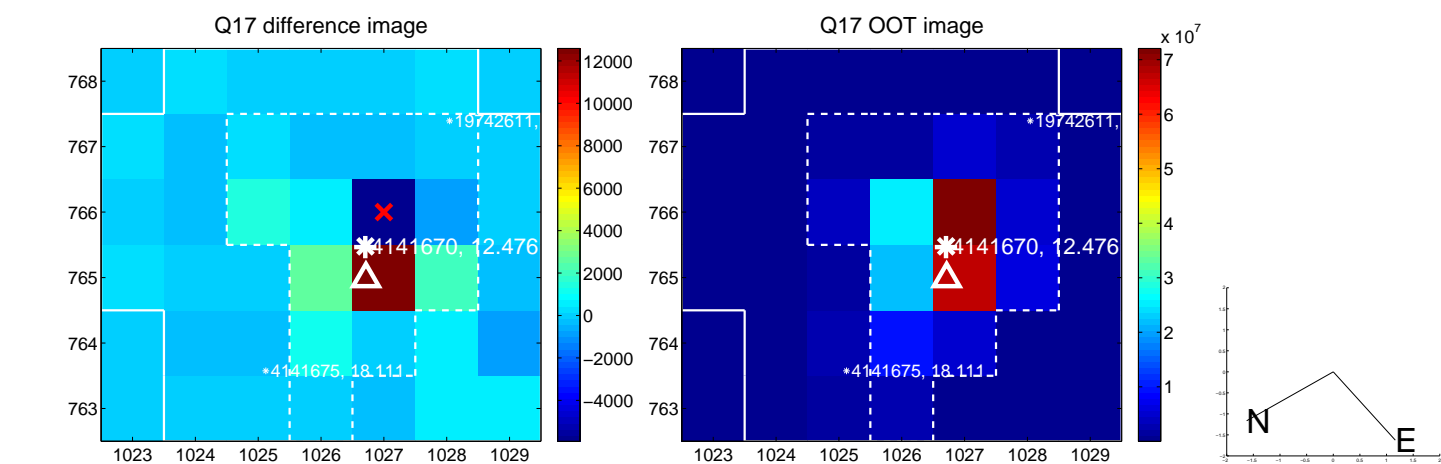


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

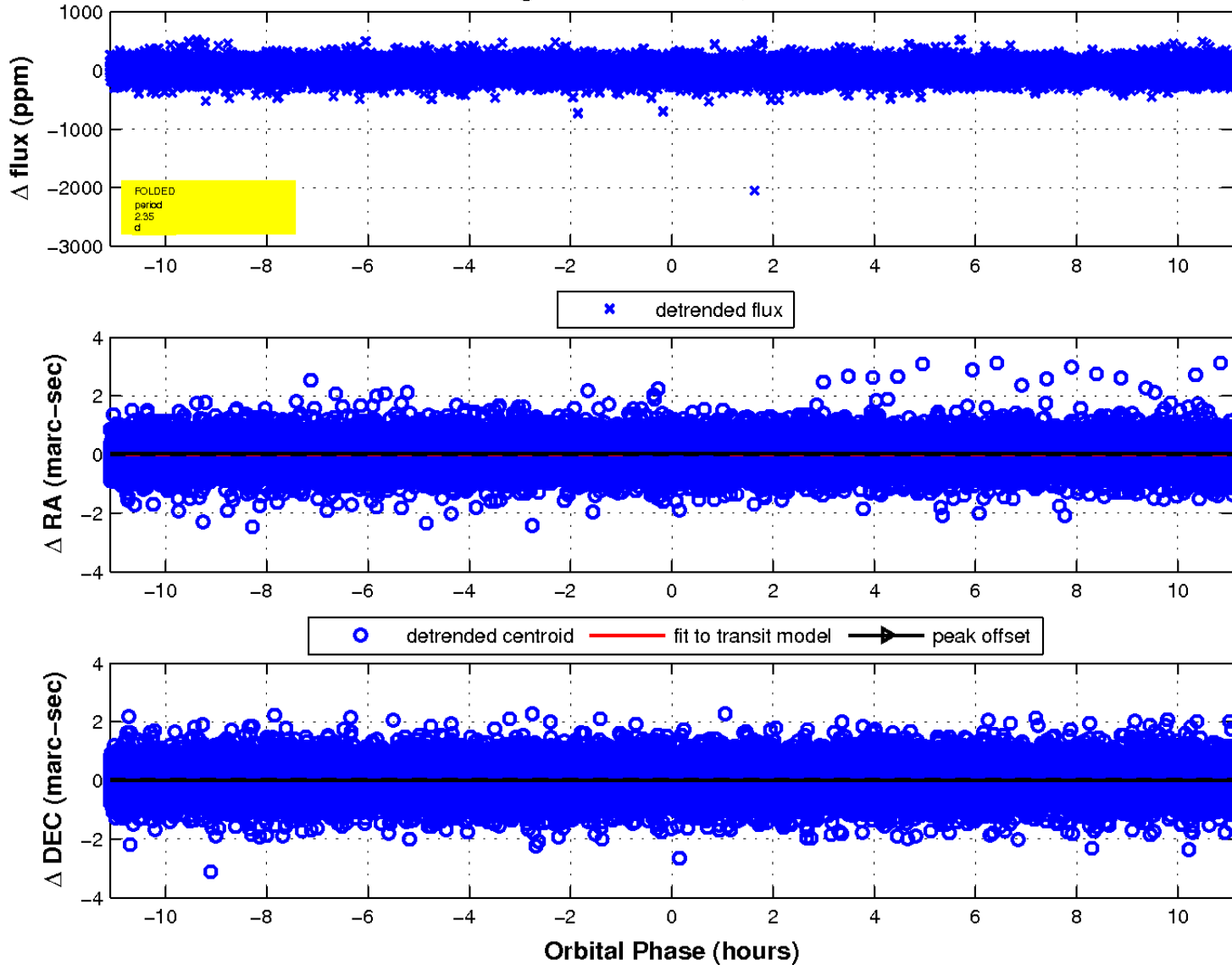




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



fluxWeightedCentroids, Planet 3 of 3



UKIRT Image

Declination

